

FM 38-1

DEPARTMENT OF THE ARMY FIELD MANUAL

LOGISTICS SUPPLY MANAGEMENT

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HEADQUARTERS, DEPARTMENT OF THE ARMY
AUGUST 1958

FIELD MANUAL }
No. 38-1 }

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., 11 August 1958

LOGISTICS SUPPLY MANAGEMENT

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* This manual supersedes FM 38-1, 27 August 1954.

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PART I
INTRODUCTION TO SUPPLY
CHAPTER 1
ARMY SUPPLY SYSTEM

A. INTRODUCTION

This is a manual about the management of the Army supply system. It is concerned with principles and policies of supply and the management skills necessary to implement them. It is addressed to those military and civilian individuals who exercise supply management responsibilities at various levels of authority throughout the supply system. The activities discussed in this manual can all be included under the broad term of "logistics." This is such a general classification, however, that for the purposes of this manual, the term "supply" has been used to denote the narrower range of functions from the initial determination of requirements for items needed through the disposal of excess material. Logistical services such as medical, communications, engineering, transportation, and training of troops specializing in these activities and services receive little, if any, attention. In all chapters emphasis is

placed upon the effective management of supply functions.

The chapters of the manual are grouped under three main headings: (1) Introduction to Supply, (2) The Management of Army Supply, and (3) Principles for the Supply Manager.

Part I, Introduction to Supply, consists of two chapters. The first chapter discusses the scope and magnitude of the Army supply system and the need for its effective management. The second chapter describes the individuals and agencies within the Army and at higher Government levels who are responsible for managing the system. Chapters 3 through 9 discuss individual functional areas of supply: storage and distribution, determination of requirements, procurement, cataloging, maintenance and repair parts, disposal of excess stocks and management controls. Chapter 10 is a summary of the management principles which underlie the discussion throughout the manual.

B. MEANING OF SUPPLY MANAGEMENT

1. Purpose of Army Supply

A part of the mission of the military services is to defend the nation. The Army's combat forces bear a major share of this burden. In the United States the six armies and the Military District of Washington, are responsible for defense of the continental United States and for preparing men for oversea combat. Together with the Air Force and Navy, the Army mounts our defenses against air attack. Overseas, the Army maintains large forces and serves as executive agent for several unified

commands of United States ground, air, and naval forces.

To support its combat forces, the Army requires service forces responsible for developing and making available to troops the weapons and equipment of warfare. A large proportion of the Army's manpower—military and civilian—is devoted to these essential tasks. The overriding purpose of these individuals is to contribute to the Army's mission of success in battle.

Supply efforts to support combat forces can mean a number of things. In the days of the cavalry, the term meant providing forage at the end of the day's march. In 1942, it meant amassing the men and materials with which to assault Europe. In the cold war situation, which characterizes the present day and which may continue throughout the entire half-century, supply means something else again.

2. World at Mid-Century

Three major factors govern the conduct of military supply in the existing climate of political and military affairs. They are: (1) the continuing threat of an enemy attack and the possibility that the attack, for which defenses must be constantly marshaled, may never occur, (2) the continuous need for the development of new weapons and improvement in the arts of war, and (3) the limitation on the dollars and the material available for defense.

The continuous threat of an enemy attack means that the supply system may be called upon at any time to support combat operations. The attack may involve a major conflict, initiated perhaps by a devastating assault upon the industrial plants and military bases of the United States. Or the attack may be limited in nature, confined to a distant localized area, and requiring long lines of supply from the United States.

It is entirely possible, of course, that a major war will not occur in the foreseeable future despite a continuation of international tensions. Indeed, the aim of our rearmament program is to deter an enemy from attacking. If the program is successful, the attack will never occur. Meanwhile, it is necessary to maintain a strong posture of defense to permit expanded mobilization and to deter aggression.

A strong posture of defense over a period that may extend for a generation or more requires continuous effort to improve the Army's ability to wage war effectively. The Army must have weapons and equipment which excel those of its enemy. Superior weapons and equipment can come only from the application of scientific discovery to military necessities. This superiority becomes progressively more important as weapons are made increasingly destructive and

warfare depends more and more on highly specialized equipment.

If the danger of an enemy attack were the only consideration, the nation might well maintain the military establishment on a war footing at all times. A maximum of security would thus be provided. New weapons would continually replace old ones at a rate limited only by technological development and industry's capacity to produce. There are factors in the situation, however, which preclude full mobilization. The safety resulting from a military establishment on a war footing must be weighed against its attendant cost. Full mobilization might produce maximum short-range security, but in the long run it might so weaken the nation's economic potential that the ability to resist aggression would be impaired.

Economy in the use of manpower, material, space, and funds is required if we are to maintain for an indefinite period a strong military force as a deterrent to aggression and a base for expansion in the event of an emergency. A large peacetime Army is being maintained, but it is far from adequate to meet wartime needs. In order to facilitate rapid mobilization, reserves have been established for certain critical materials and equipment. The solution represents a carefully considered compromise; no mobilization plan can possibly put troops in the field as rapidly as would be the case if the Army were maintained fully mobilized. This compromise is necessary in order to equate the needs of national safety with the objective of maintaining a healthy economy.

In this plan of defense, supply dollars are an item in short supply. In the existing situation the need for economy takes on a new meaning. The nation recognizes at the outset that the danger is great and that the dollars available for defense are limited. Recognizing this, it becomes extremely important that a full measure of defense be received for every dollar spent. Never in the history of the Army supply system has economical supply been so important to the accomplishment of military objectives or to the welfare of the nation.

During World War II and the Korean Conflict the primary problems of supply were associated with getting the goods into the system and dis-

tributing them to the troops. The nation's industrial plant and the Army supply system combined to assure that desperately needed equipment was available where it was needed and when it was needed. The objective was to get goods to the troops; any inefficiency involved in speeding up this process was worth the price. The nation still expects outstanding performance from the Army supply system but the problems of today require the kind of miracles which mean doing more with less.

This emphasis on doing more with less suggests a different way of thinking about the supply system as it was developed in World War II and in the Korean Conflict. *For example*, the Army has developed a superlative system of reports for measuring the adequacy of supply in quantitative terms. The reporting system, however, is not designed to balance accomplishment against cost. Only recently has the Army devoted attention to obtaining the dollar value of its inventory or its issues. While these figures are of little use in their raw form, they are basic to any system of reports designed to evaluate the dollar economy of supply operations. Dollar figures and dollar reports will not automatically produce dollar savings. Dollar savings will come when supply managers are cost conscious, and cost consciousness is a way of thinking about the supply process. Dollar accounting will provide cost information, and with this information effective management decisions can be reached.

3. Supply Management

To fulfill his dual responsibility of protecting the nation and providing this protection as economically as possible, the supply manager must continually appraise his operations in terms of two basic questions: (1) what is being done? i.e., how good is the product or service? and (2) how efficiently is it being done? i.e., how much is it costing? It does no good for a com-

pany to move more goods off its shelves, or to sell more automobiles than its nearest competitor if it costs the company more than the selling price to do it. In a profit and loss economy, management is compelled to evaluate what it is doing in terms of what it costs to do it.

In the Army supply system, the emphasis has traditionally been placed on the effectiveness of supply operations rather than on the cost to supply. That is, the overriding consideration has been making materiel available when it was needed and where it was needed. In a military organization this concentration on supplying using units, sometimes at the expense of cost factors, is of course a legitimate emphasis. Failure to supply troops with needed weapons and equipment can result in disaster. In business the penalty for failure is bankruptcy, an undesirable end but far less extreme than defeat on the battlefield.

Individuals responsible for managing the Army's supply system therefore tend to resist the imposition of the businessman's preoccupation with costs upon a system that is governed by considerations other than cost. Yet these same individuals recognize that the Army cannot tolerate inefficiency or condone waste. Indeed, inefficiencies in Army supply are of more concern to the nation than wasteful business practices, because the Army's supply requirements represent such a large portion of total national resources.

It is the task of supply management to appraise and control the cost to supply without impairing the ability to supply on time and in required quantities. Accomplishing this objective is a difficult task, necessitating a high order of management competence and appropriate tools of management. The Army has already made important strides, particularly in the area of financial controls, which will provide new and useful tools for managing the supply system.

C. PROBLEMS OF SUPPLY MANAGEMENT

1. Introduction

There is no management responsibility in industry equivalent in scope or complexity to the responsibility of managing the Army's supply

system. The security of the nation itself depends upon well-managed supply operations. Moreover the scope of the management job, as measured by the size and the diversity of the

inventory to be managed, the value of the physical facilities involved and the number of people required to do the job, dwarfs any similar industrial responsibility. Many of the most difficult management problems are directly associated with the magnitude of the system. Other problems arise from the absence of the profit motive, by which industry controls and evaluates its day-to-day operations, the lack of competition and the rapid rate of change which characterizes military operations in general and which poses particularly difficult problems for the supply manager. These management problems are discussed in this section.

2. Magnitude of the Supply System

The Army's responsibility for managing its supply system is the largest job of supply management ever to confront a single organization. The value of the inventory in CONUS depots is approximately 16 billion dollars. This is about one third the value of all the inventories of all the manufacturers in the United States.

The Army's multibillion dollar inventory is presently stored at 48 depots and 17 storage activities in the continental United States. These depots aggregate over 300 million square feet of storage space, about half of it covered space. This represents substantially more storage space than the total of all commercial warehouse space in the nation.

Approximately 40,000 personnel are engaged in the receipt, storage, and issue functions of the Zone of the Interior depot system. At the present time the expense of operating the system amounts to nearly 300 million dollars annually.

Of what significance is the magnitude of the supply system to the Army supply manager? Of foremost concern is the size and value of the inventory itself. If the inventory is larger than necessary to meet current and anticipated needs, the costs of maintaining the supply system are substantially increased. These increased costs result from several factors.

Unnecessary interest charges represent one cost factor associated with an inventory which is larger than necessary. The stock owned by the Army is in effect financed with borrowed funds on which an average of perhaps 3% interest must be paid annually. Reductions in

the money utilized for inventory purposes will tend to release funds which can then be applied to decreasing the Government's national debt. Thus a billion dollars of excess inventory could involve needless annual interest charges of 30 million dollars assuming there is no depreciation in inventory value.

Another cost factor associated with an excessive inventory is storage cost. A larger inventory means that additional storage space is required, space that is expensive to construct and maintain. If funds are not available for construction of additional covered storage space, material that should be stored in covered space has to be stored outside. This increases the rate of deterioration of the goods and raises maintenance and preservation charges.

Excessive inventory also raises costs associated with obsolescence and eventual disposal. If the inventory is larger than it need be, the factor of obsolescence is given more time in which to take its toll. Goods that are not issued and consumed remain in the warehouse, and even if they do not deteriorate physically, they may eventually become obsolete. There is obviously little security value in outmoded equipment, and disposition of such equipment will be necessary eventually. While some return can be obtained through surplus sales, it is small in relation to the initial cost and the storage costs during the period when the equipment was held unnecessarily.

The cost of operating the ZI depot system varies with the size of the inventory. Reductions in the size of the inventory, would be reflected in lower operating costs. One of the biggest areas for reductions is in manpower; a smaller inventory could mean that less people would be needed to operate the system.

While operating costs can be decreased by reducing the size of the inventory, it is possible to obtain lower operating costs through management efforts even if the size of the inventory remains the same. The opportunities for savings are great; with annual operating costs of some 300 million dollars, an increase in efficiency of only 1% would amount to a yearly saving of three million dollars.

The Army is embarked upon a broad program of supply management, designed to provide new

management tools and to encourage the development of a management point of view. A point of view of this kind must include two basic components: (1) a habitual emphasis on assessing supply performance in terms of its costs and (2) a broad understanding of the process of supply not as individual and separate functions, but as an interrelated chain of activities from the conception of a new weapon or a new item of equipment through its procurement, storage, distribution, and consumption. This point of view together with the new management tools, is bound to result in more economical operation of the supply system.

3. Diversity of Items

A second management problem, related to the size of the Army's inventory, arises from the diversity of items carried in the inventory. Managing a multibillion dollar inventory is in itself a man-sized task; the task becomes far more complex when the items to be managed range from iceberg lettuce to the heavy tank.

The Army's inventory is composed of slightly under 1,000,000 items of supply, of which about 700,000 are centrally procured and supply controlled. Some items are low cost, others high cost; some are easily acquired through normal commercial channels, others can be obtained only through the most painstaking cooperation between the Army and industry. All the items essential to both military and civilian life as well as those peculiar to the Army must be purchased, stored and distributed to the troops. Obtaining these approximately 1,000,000 items of supply requires the services of more than 95% of the industries which make up the American economy.

In order to manage this inventory properly, it is necessary to segregate the entire range of items into meaningful categories. These categories can be developed upon the basis of the nature of the item, its importance to supply needs or its behavior in the supply system. The following paragraphs indicate some of the ways in which the items in the system are described.

a. Principal Items, Secondary Items, and Repair Parts. The items in the supply system are divided into three broad categories: principal items, secondary items, and repair parts. This

distinction is an important one for the purposes of supply management. By a process of selection, less than 700 items have been designated as principal. These items represent less than 0.1% of the items stocked, but account for about 60% of the Army's procurement dollar. They are the high dollar value items: the tanks, the skysweepers, and the cranes. They are also the low dollar value items with high rates of issue: the M-1 rifle and the caliber .30 ammunition. As a group they are of first importance in mobilization planning because their availability would govern the rate at which mobilization could proceed.

Excepting repair parts, clothing, and subsistence, the secondary items embrace everything else carried in the supply system. They include the soap, radios, paint, aspirin, and nails of Army supply. These secondary items are not of critical importance in mobilization planning because they can, for the most part, be obtained from industry about as fast as men can be drafted. Mobilization would involve a shift in distribution of many of these items rather than an increase in their total demand. Coffee is not necessarily consumed in greater quantities during full mobilization, but rather, the military consumes more and the civilians less.

Repair parts include all essential elements, materials, components, assemblies or subassemblies which may be required for installation in the maintenance and repair of an end item. The gun tubes, carburetors, bolts, and screws are considered repair parts. The differences between principal items, secondary items, and repair parts and their effect on methods of supply are further defined in chapter 4.

Opportunities for economy exist in all three classifications of items of supply, but because of the difference in the nature of the categories, these opportunities exist in different ways. In the case of principal items, the opportunities for more economic supply exist largely in the areas of requirements computation and procurement, while for minor secondary items and repair parts the distribution and handling operations offer the greatest opportunities. If the procurement of tanks can be reduced by one, approximately a quarter of a million dollars will be saved. On the other hand, a reduction

of 10% in the procurement of rivets would amount to only a small saving in procurement dollars. If appreciable savings are to be achieved for items of this kind, they must come from improved storage and distribution practices. *For example*, changing the basis of issue of rivets from single rivet to multiples of the manufacturer's unit of pack might save more in depot operating dollars than the total dollar value of the rivets purchased.

Despite their differences, principal, secondary, and repair parts items cannot be completely divorced from one another for supply management. This inability to separate the three entirely is particularly evident in the case of repair parts and depot maintenance. Most of the 725,000 repair parts stocked are required to maintain less than 700 principal items. The high percentage of the Army's maintenance dollar which is expended for these few principal items accentuates the direct relationship between the procurement and maintenance costs for principal items and the procurement, storage, and distribution costs for a majority of the repair parts. This relationship is further discussed in chapter 7 on maintenance and repair parts.

b. Military and Commercial Items. A second broad classification of Army supply items is their segregation into military or commercial categories. In many instances these categories duplicate the principal and secondary item classifications. Repair parts are not classified specially.

It is not always easy to designate Army items of supply as being either military or commercial. Light bulbs, office supplies, and nails are clearly commercial items but it has been argued that the special techniques for packaging items of this kind for overseas shipment makes them, from the Army's standpoint, military rather than commercial items. One way of differentiating between military and commercial items is in terms of whether the items are regularly stocked by commercial organizations to supply the normal demands of their civilian customers.

There are many opportunities for economy in the supply of the Army's commercial-type items. One of the most promising opportunities is to

rely to a greater extent upon normal commercial channels of supply rather than to procure and stock large quantities of commercial items in the Army supply system. As chapter 5 on procurement indicates, the Army is already relying to a greater extent on commercial channels through such practices as the use of the open end or call type contract and local rather than centralized procurement. These practices have the effect of reducing the size of the Army's inventory and shortening the supply lines.

They also enable a greater percentage of the purchases of commercial items to flow directly from the manufacturers to the points of use rather than through the depot system, with consequent reductions in depot handling, shipping time, and under certain conditions, transportation costs. The possibility of even more extensive reliance on commercial channels for the supply of secondary items is discussed in chapter 3, on storage and distribution.

Items of a purely military nature include such things as weapons, tanks, and ammunition. Many of these items are designated among the 700 odd principal items and receive special attention, particularly with respect to determining their requirements for current needs and mobilization reserves. The mobilization reserves consist of items of this nature rather than of such easily obtainable items as paper towels and wastebaskets. The need for stockpiling is directly related to the difficulties and the time periods associated with obtaining the items. Most of the effort in mobilization planning and in assessing the industrial capability of the nation is directed toward long lead time items, most of which are purely military in nature.

c. Fast-Moving and Slow-Moving Items of Supply. Another useful way of segregating the items in the supply system is by the speed with which they turn over, that is, their frequency of issue. At one extreme many of the items supplied by the Chemical Corps have never been issued while at the other extreme, many Quartermaster items are used by the troops every day. The Army Field Stock Control System has disclosed some interesting facts on the frequency of issue for many items. In Ordnance, *for example*, less than 15% of the repair parts

stocked account for over 85% of the line items issued.

Of what significance are these facts? The first point relates to how much should be stocked in depots and in how many depots throughout the system. Fast-moving items of supply, the so-called "best sellers," should be distributed widely throughout the system. Conversely slow-moving supplies need be carried at only one or two depots. Moreover, the reporting system can be simplified on the basis of frequency of issue; slow-moving items need not receive the same attention as the best sellers. Further, stock levels should vary directly with the issue experience of the item.

Issue experience, however, is often a troublesome guide, as will be indicated at many places in this manual. At this point perhaps a single illustration of the vagaries of issue experience will suffice. The rotor for the distributor of a jeep engine is normally a slow-moving item. But during one period of World War II, the troops in Italy were demanding more rotors than the rest of the Army combined. Because the supply of rotors was based on past issue experience, this created a critical supply problem. An investigation revealed that rotors had become a kind of coin of the realm in Italy. First, jeep drivers immobilized their vehicles when they left them by removing the rotors. But rotors also served a secondary purpose of identifying a GI as a jeep driver. Girls liked jeep drivers and GI's liked girls. Therefore, many a foot soldier attempted to equip himself with a rotor so that he might give the appearance, at least, of being a jeep driver. The diversion of so many rotors to Italy created a shortage of rotors later on in the Philippine campaign. It became difficult to supply troops with sufficient rotors, let alone the native population which soon realized that possession of a rotor might eventually lead to possession of a jeep.

4. Absence of Profit Motive

In the Report of the Advisory Committee on Army Organization, 10 February 1954, it is stated that "in the business operations of the Army there is an especial need to find a substitute for the profit and loss statement in

industry. Such means constitute an essential tool of management."

Dollars are symbols for men and materials and represent perhaps the most important management control in industry. Dollars are used in industry as an incentive; the anticipation of a dollar profit acts as a strong motivation for individual and organizational effort. Dollars also serve as a means of appraising individual and organizational performance; a profitable company is presumably one that is efficiently operated.

Dollars are used in industry to provide standards for achievement and a means of measuring the degree to which a standard is achieved or exceeded. In many companies an individual manager is given a budget under which to conduct his operations. He may be given considerable freedom in deciding how best to spend the funds available to him. An attempt is made to insure that he controls the accumulation of all costs relating to his area of responsibility.

Under these circumstances it is possible not only to control costs but to appraise the effectiveness of each operation assigned to an individual manager. If the work is accomplished satisfactorily within or below the budget amount, the manager is presumably doing an efficient job of managing. Raises in pay, bonds arrangements and promotions can be and often are employed to encourage such efficient management. Conversely, pressures of a negative kind are employed or implied as a means of avoiding unprofitable operations.

The important point is that in a profit and loss economy there are positive incentives to good performance and a means, through the dollar sign, of appraising the quality of individual managers throughout the organization.

Many of the Army's operations have industrial counterparts. Depots perform some of the same services as commercial warehouses. Manufacturing activities in the Army, as carried on in arsenals and at other installations, closely approximate similar operations in industry. The conspicuous difference has been the absence of a profit and loss framework within which to conduct these business activities of the Army.

By its very nature the Army is not a commercial organization. Its supply system is not

subject to the force of competition; its existence does not depend upon a continuing record of "profitability." Yet as pointed out earlier, it is of tremendous importance that the system be managed efficiently. As in business, securing the maximum effort of Army supply managers requires the use of incentives both monetary and nonmonetary. The Report of the Advisory Committee on Army Organization goes on to say that ". . . incentives are especially needed to attract and hold men in the important supply functions which constitute an increasingly significant aspect of the Army's mission."

But incentives do not constitute by themselves a substitute in the Army for the profit and loss statement in industry. Management tools are also needed which will approximate in their effect and usefulness the beneficial aspects of the profit and loss statement and the accounting and fiscal controls that are required to produce the profit and loss statement. The Army is attempting to develop substitutes for these business controls; essentially it is engaged in developing a system of controls by which the cost of performance can be measured. When the cost of performance is known, it will be possible to make more informed management decisions. *For example*, in chapter 3 of this manual the question of whether to disperse stocks at many locations near the customers or to concentrate them at only one or a selected number of locations is discussed in some detail. In considering this and other problems, it is difficult to reach management decisions without knowledge of alternative costs. Cost data are also essential in deciding such questions as when to dispose of obsolescent equipment or material.

The costs of some of the manufacturing operations carried on within the supply system are becoming better known through extension of the use of industrial funds. These funds, which are discussed in later sections of the manual, put manufacturing activities on a working capital basis and make possible the formulation of a military equivalent of industry's "cost of goods sold" figure.

In summary, the absence of the profit motive has made the job of managing the supply system more difficult. Decisions requiring cost data have had to be made in many instances

without the benefit of such data. Of equal importance, the lack of such data has complicated the problem of appraising the performance of the individual managers and particular operations within the supply system. As the Report of the Advisory Committee on Army Organization has indicated, it is important that an equivalent of the profit and loss statement be developed to meet the needs of the Army. This manual will point out in later sections that a start toward the development of such a substitute is already well under way.

5. Absence of Competition

Closely related to the profit and loss basis on which industry is conducted is the factor of competition. Competition has been called the driving force in the American economy; the pressure of competition acts as an incentive to better performance. If a company cannot compete in terms of the quality of its product or services and the costs to provide such products or services, it cannot continue long in business. The continuing pressure of competition on businessmen probably accounts for much of the progress and increasing efficiency that has tended to characterize the American economy.

The Army supply system, on the other hand, has no competition for its customers' business. It has occasionally been argued that this absence of competition is simply proof that military supply is, after all, a very simple business. If the supplies are not available, the customer must wait or do without. He cannot take his business elsewhere as his civilian counterpart might do. This is true, but to say that it simplifies Army supply management is to miss the point of military supply.

Because there is no alternative source of supply, the Army supply system has a far greater responsibility to its customers. Commercial organizations can and do specialize. Even Macy's has not attempted to meet all of the needs of all of its customers. But the Army supply system must be prepared to meet all the legitimate demands made by using units.

One of the leading authorities in the department store merchandising field recently recommended—only half facetiously—the "splinter" method of inventory control. By this he meant

that when the stock clerk reaches in the wooden stock bin and gets a splinter in his finger because the bin is empty, it is time to order more goods. Behind this statement is the recognition that slow-moving inventories are uneconomical and, in fact, the largest single cause of department store failures.

But the Army system does not exist to serve an economic but a military end. That certain items cannot be supplied economically from a commercial point of view does not relieve the Army of the responsibility of supplying these items. From the point of view of the Army supply manager, the problem is not what items to supply, but rather the most economical way to provide the items which must be supplied.

The absence of competition has another important bearing on the responsibilities of the supply manager. As has been pointed out, commercial organizations often make progress in developing new methods and techniques through the stimulation of competition. Trade organizations freely promulgate average operating data to provide a standard against which the individual organization can measure its performance. There is constant pressure to improve the product or service and lower its attendant cost.

The absence of outside competition in the Army supply system means that progress in Army supply management must come largely from within. Agencies in the Army must, in effect, compete with each other. With suitable cost data, it will be possible to achieve at least a part of this objective; *for example*, depots may be placed on a competitive basis and the Army's manufacturing activities can be placed in competition with each other and with similar types of commercial activities.

6. Factors of Change

Managing the supply system is made difficult by virtue of its size and complexity and a general absence of the desirable aspects of the profit motive and competition which have been responsible for much of our industrial progress. An additional management problem of perhaps equal significance arises from the factors of change, both technological and personnel, which characterize the system.

Technological change is a constant and desir-

able factor but it poses difficult problems in determining what items to procure, how many items to procure and how long the items should be retained in the supply system. Throughout history the arts of war have changed from period to period and weapons have become increasingly complex and effective. In the past generation, technological developments have proceeded at an accelerated rate and the Army's modern arsenal of atomic weapons, missiles, and radar-controlled anti-aircraft guns bears little resemblance to its arsenal of ten or twenty years ago. The change, moreover, has been reflected in more than basic weapons; transportation equipment, clothing, even office machinery have undergone a similar degree of change.

Improvements in the arts of war have always been a necessary concomitant to military responsibility, but in the present situation they take on added significance. The United States, relative to potential enemies, is short on manpower. This deficiency must be counterbalanced by greater firepower, by more effective and mobile weapons and equipment, and by the most efficient utilization of total manpower at our disposal. Thus the Army's research and development activities become increasingly important and the products of research programs can be expected continually to be introduced into the supply system.

The introduction of new items of equipment poses the usual problems for current supply activities and particularly difficult problems with respect to mobilization reserves. Mobilization reserves are accumulated over a certain period of time. As time passes, our expanding technology renders the mobilization reserves obsolete. Thus at more or less regular intervals of time, the equipment in reserve, or part of it, become technologically obsolete and the defense system is correspondingly weakened. This "cycle of vulnerability," as the Deputy Secretary of Defense has termed it, is only one of many problems that technological change imposes upon the managers of the supply system.

The workload of the supply system is directly influenced by changes in the international situation. From the cutbacks following World War II, the supply system was suddenly required to respond to meet the demands of the Korean Conflict. The present period of quiescence may, at

any moment, give way to active involvement in hostilities. No businessman, despite seasonal or cyclical fluctuations, faces the degree of change that must be accepted by the Army supply manager. The businessman is able to work in a relatively stable environment in which orderly planning toward a desired objective can go forward. The objective of the Army supply manager may be firm at any given moment, but experience has taught him to be prepared for sudden and dramatic change.

These changes in workload are accompanied by particular difficult personnel problems. A small nucleus group may be required to expand to twice or ten times its size. New people must be located, trained and given responsibility often in excess of their experience or capabilities. At some later date, the expanded workforce may be cut back, and typically these cutbacks are soon followed by periods of expansion, and the cycle of hiring and training goes forward once again.

An added burden in the area of personnel change is the Army's policy of rotating its officer personnel. Rotation of assignments certainly helps to develop well-rounded officers, but it complicates the immediate task of managing the supply system. Supply management is a technical field; people with such responsibility in industry undergo long periods of apprenticeship to gain the knowledge and experience to fit them for managerial positions. An Army officer, on the other hand, may be suddenly thrust into a position of supply management responsibility, without adequate training or prior experience with supply. As he is gaining a growing mastery over his field, he must keep in mind that his next assignment may be in a tactical unit. The burdens that these shifting assignments place on the individual and on the supply organization far outweigh those that accompany the shifts in industry.

Change then is a constant factor in Army supply. Much of it is necessary. Although management decisions are facilitated in a stable environment, the Army supply manager is expected to make decisions in an environment that is constantly shifting. A high order of competence is required to administer activities under these conditions and a premium is placed upon running a flexible operation. Not the least of the problems

is insuring that policies and practices that govern peacetime operation of the system are capable of extension or easy modification to meet the heightened demands of warfare.

7. Conclusion

From even this brief discussion of some of the problems of managing the Army's supply system, it is apparent that the task is a profoundly difficult one. The Under Secretary of the Army recently stated, in reference to only one of the many supply management problems, that the "problem is so big that it looks almost unconquerable. Our first approach was how to get this ponderous mass on a workable basis."

Getting a ponderous mass on a workable basis means breaking the overall job down into manageable segments and placing each one under the direction of a competent manager. In its list of principles to guide the Army in organizing effectively to accomplish its mission, the Report of the Advisory Committee on Army Organization suggests the desirability of this objective. The report states:

a. There should be clearly defined lines of responsibility and accountability for each principal activity included within the Army's mission . . . from the highest to the lowest echelons.

b. Each responsible official—from the Secretary to the commander of an organization, camp, post, or station—must have adequate and undiluted authority to discharge the responsibility fixed in him.

c. There should be a means of measuring the performance of every individual and organization responsible for a segment of the Army's mission.

Because of the nature of the supply mission and the fact that the problems of supply management are continually changing, measuring the performance of the individuals and organizations comprising the system is in itself one of the most difficult problems of supply management. During World War II, management was appraised almost solely by the extent to which troops were adequately supplied. Tonnage figures were often an excellent indicator of effective performance. In peacetime or in the present cold war period, management must be appraised also in terms of economy of supply,

and the dollar sign takes on added significance. But dollars and defense are interrelated, and economy cannot override national security. Yet in the present situation getting goods to the troops is not good defense unless the job is accomplished at the lowest ultimate cost. Measurement of the performance of individuals and or-

ganizations in the supply system by either tons or dollars alone gives a lopsided view; today's situation demands that accomplishment be balanced against cost. This problem, perhaps the central one for supply management, will be discussed as it relates to each of the functions and areas of supply treated in this manual.

CHAPTER 2

ORGANIZATION FOR ARMY SUPPLY

A. INTRODUCTION

This chapter will discuss in summary terms the individuals and organizations who are responsible for managing the Army's supply system. Like chapter 1, this second chapter is introductory in nature. The purpose of these two chapters is to set the stage, so to speak, for the more detailed examination in following chapters of functional areas within the chain of supply.

In discussing the management of the Army supply system, it is necessary to go beyond the organizational structure of the Army to higher Government levels. As part of the military establishment, the Army is governed by the Department of Defense, and its supply activities are influenced by directives promulgated at OSD level. Its supply activities are also directly influenced by decisions of the National Security Council, the President, the Congress and by public opinion.

The organization for supply, then, extends from levels of national policy, where objectives are defined and dollar and statutory limitations established, down to the level of troop units which consume supplies. It is possible, within the military establishment, to divide the supply management function into two categories, supply

planning and supply operations. The former would include the formulation of strategic plans, primary programs and military budgets. The latter refers to the process of forecasting the demands of existing defense forces and taking the necessary supply action to meet these demands. It is apparent, of course, that what we here refer to as supply operations requires constant planning but it is planning of a different order from that concerned with strategic objectives, programs, and budgets.

The formulation of plans, programs and budgets is carried on to a greater or lesser extent at all levels of the Army. Supply operations, on the other hand, are largely managed by and within the seven technical services under the direction and control of the Deputy Chief of Staff for Logistics. Since this manual is primarily concerned with the management of supply operations, emphasis is placed in this and subsequent chapters upon the management problems confronting the Office of the Deputy Chief of Staff for Logistics, and the technical service headquarters and field activities. Before discussing the supply management responsibilities of these agencies, however, it is necessary first to see how they are influenced by higher authority.

B. SUPPLY MANAGEMENT AT NATIONAL POLICY LEVEL

1. Introduction

At the level of national policy the broad framework is established within which the operations of the supply system must be managed. The President, his executive agencies, the Congress, and the public share in formulating and accomplishing the objectives of national security. They also share in defining the role of the military establishment and in determining the share of the nation's resources available to

the Army for the support of military units and operations.

2. The President

As Chief of the Executive Branch of Government, the President has the Constitutional responsibility for carrying out the laws enacted by Congress. In terms of national security, the President allocates the defense mission among his executive departments and agencies and he

directs and coordinates their execution of the foreign, domestic, and military aspects of the national security mission.

The President is specifically authorized by the Constitution, with the advice and consent of the Senate, to make treaties with foreign nations and he directs the Department of State in the conduct of foreign affairs. While the conduct of foreign affairs is a civil responsibility, it is closely allied to defense problems. The network of treaties which links us to nations of the free world is a powerful deterrent to aggression against any of the member nations. But this system imposes on us a responsibility for the defense of other nations as well as for the defense of our own shores. In terms of supply management, this means that we must be prepared to support combat operations in any quarter of the globe.

Domestic policy, no less than foreign policy, has a significant impact on both defense and on Army supply management. The Federal Government is financed either directly through taxation or indirectly through debt financing. The Department of Defense budget is larger than the combined budgets of the other departments. Army supply requirements represent one of the largest items in the defense budget. It follows, therefore, that the Treasury Department's task of financing the Federal Government must be closely coordinated with the financial requirements of the Army supply system.

Each year the executive departments, including Defense, submit their annual budgets to the President through the Bureau of the Budget established in the President's executive office. The President submits the Federal budget to Congress for review and enactment, subject to any changes deemed to be advisable. With the budget, the President sends to Congress statements designed to show, in all practicable detail, the financial condition of the Government together with the recommendations for new taxes, loans, or other appropriate action to raise funds to support budget recommendations.

After making whatever adjustments it considers desirable, Congress enacts the necessary legislation to raise the funds needed.

Because many changes may occur in military demands during the two-year period required

for the preparation and submission of the military budget, the President maintains expenditure control of the military funds even after the money has been appropriated by Congress and raised by the Treasury Department. The Army must justify its proposed expenditures to the President, as represented by the Bureau of the Budget, before the money becomes available for Army supply.

In addition to being the Chief of the Executive Branch of the Government, the President is also designated by the Constitution as Commander in Chief of the Armed Forces.

Congress in the National Security Act of 1947 created the National Security Council to assist the President in coordinating the various elements of national security policy.

3. The National Security Council

The National Security Council is composed of the President, as chairman, the Vice-President, the Secretaries of State and Defense, the Director, Office of Defense Mobilization, and the Director, Foreign Operations Administration. Other individuals, such as the Chairman of the Joint Chiefs of Staff, the Secretary of the Treasury, and the Head of the Central Intelligence Agency, are also invited to attend the Council's meetings. The decisions of the Council have a profound influence upon the objectives and the operations of the Army supply system.

The National Security Council assists the President in defining the broad objectives of defense and translating these broad national security objectives into coordinated missions for the executive departments. *For example*, if the containment of an aggressor nation were an objective, the Secretary of State might advise the President concerning the treaties necessary to accomplish this objective. The Secretary of Defense might assist in determining both the strategic concept and the military strength necessary to support the foreign commitments recommended by the Secretary of State. The Director of Defense Mobilization might contribute his views on the economic ability of the nation to support both the foreign and the military commitments implied in this plan of defense.

The impact of decisions of the National Secu-

rity Council upon the management of the Army's supply operations is clearly demonstrated by a recent decision popularly known as the "New Look." The Secretary of State, in announcing this decision to the public, stated that the United States would respond to aggression with weapons and at places of its own choosing. The Secretary's announcement was interpreted in the press to mean that the United States might employ atomic weapons at strategic centers removed from the immediate scene of the aggression. This interpretation was taken to mean that the planning activities of the military establishment were simplified. First, prior indecision as to the desirability of employing atomic weapons was presumably eliminated. Secondly, the immense difficulties of attempting to plan for response to aggression at the immediate scene of the aggression—were presumably lessened since the nation would choose the place at which it would respond.

The implementation of a basic policy like this one has a significant effect upon force levels and weapons systems and, thereby, upon the objectives and workload of the Army supply system. Less fundamental decisions of the National Security Council have a similar effect upon individuals and agencies in the Army responsible for meeting supply requirements. Thus the National Security Council, as a kind of "Super-Cabinet," establishes through its decisions the basic courses that Army supply must follow, within the limitations imposed by congressional statute and available funds.

4. The Congress

In our check and balance type of government there is an inevitable interaction between the spheres of responsibility assigned by the Constitution to the President and to Congress. Stated simply, the Legislative Branch of the Government makes the law and the Executive Branch carries out the law. Since the Army's supply operations must be carried on within statutory limitations, the Congress thereby exerts a controlling influence. The influence of the Congress upon supply management, of course, goes well beyond its enactment of governing legislation.

The military mission can be accomplished only through the money appropriated by the Congress. At the beginning of each calendar year the President submits his budget for the following fiscal year to Congress. Congress reviews the budget and may make reductions in it prior to appropriating money. In practice congressional cuts in military budgets are usually smaller than the cuts previously effected by the Department of Defense and the Bureau of the Budget. But because the congressional cuts come after the reductions effected within the Department of Defense and the Bureau of the Budget—the congressional cuts are more significant than their dollar magnitude or their percentage of the total military budget would indicate.

In addition to budget review, Congress directly influences the conduct of supply through statutory regulations. *For example*, Public Law 413, the Armed Services Procurement Act, affords greater flexibility in government. Public Law 216 requires the Defense Department to establish a unified system of financial accounting. As a result of Section 638 of the Department of Defense Appropriations Act of 1953, Department of Defense Directive 4000.8, "Basic Regulations for the Military Supply System," dated 17 November 1952, was promulgated. In order to guide Congress in formulating legislation affecting the military establishment, the Joint Armed Services Committee of Congress maintains close liaison with the military services, and conducts investigations of both a routine and special nature.

These investigations, even when they do not lead to new legislation, have an important influence upon the conduct of supply operations. *For example*, the investigation of the ammunition situation in Korea highlighted certain problems and led to changes in supply policies and practices. Often Congressional investigations are of a less formal nature, involving questions of suggestions from individual Congressmen to responsible authorities in the supply system. These questions and suggestions are often helpful in improving supply practices, although the time required to answer inquiries sometimes imposes a severe burden on Army personnel.

5. The Public

In a democracy the people are sovereign; the course of Government is set at election time by the public. An aspirant to public office who advocates an unpopular course of action is likely to be defeated. An official in office who pursues such a course is unlikely to be re-elected. Thus, directly at election time and indirectly at other times, the public influences the conduct of Government.

The effect of public opinion on defense policies is manifested in various ways. The people of the United States reject aggression; accordingly, supply planners must concentrate on the requirements for a retaliatory attack, not an initial attack. Public opinion also exerts an influence on the issues that arise from day to day. A newspaper columnist may allege that improper supply practices have occurred at an Army installation. The Office of the Under Secretary of the Army and supply agencies

will investigate the situation to verify the accuracy of the columnist's disclosure, and take whatever action appears to be necessary.

As an agency of the people, the Army is responsible to the people directly or indirectly through their elected representatives. The influence of public opinion, by means of the press, radio, and television, can contribute to improve supply practices. Yet these organs of public opinion and the people themselves must temper their criticism with responsibility and understanding. *For example*, the public expects Army supply managers to be correct 100% of the time. This tendency is seen particularly in the field of Army procurement. No businessman expects his managers and workers to be right all the time; a standard somewhat lower than 100% is considered satisfactory. By trying to be right all the time, the Army often spends more than it needs to and its personnel tend to become more conservative than they should be.

C. SUPPLY MANAGEMENT AT DEPARTMENT OF DEFENSE LEVEL

The Secretary of Defense is responsible for accomplishing the military aspects of the national security mission as they have been defined by the National Security Council and delegated to the Department of Defense by the President. The Secretary of Defense directs and coordinates the military services in their efforts to fulfill their assigned missions. He is assisted by the Joint Chiefs of Staff and by Assistant Secretaries of Defense.

The Joint Chiefs act in an advisory capacity to the Secretary. They interpret the broad guidance of the National Security Council and translate it into specific missions to be accomplished by each of the armed services. On the basis of the joint strategic objectives plan formulated by the Joint Chiefs of Staff, the Army prepares a midrange estimate which establishes the Army's objectives in terms of major forces, facilities, and materiel.

The Army formulates three controlling and thirteen derivative and special purpose primary programs in support of the midrange estimate. The Army budget represents the dollar cost of accomplishing the primary programs. The Office of the Secretary of Defense approves the

Army Programs and budgets prior to the submission of the defense budget to the President.

The Assistant Secretaries advise the Secretary of Defense in their specified areas but they are not empowered to take independent action.

The authority of the Secretary of Defense over all aspects of the armed services is extremely broad and, accordingly, his influence over the Army's supply policies is substantial. *For example*, Department of Defense Directive No. 4000.8 sets forth principles to guide procurement, military activities of a commercial and industrial type, distribution, cataloging and standardization and other functions. The directive also limits certain activities; *for example*, it states that no additional independent or expanded supply facilities for common-use standard-stock items of supply shall be created without prior approval by the Secretary of Defense.

The Army, like the other military departments, is responsible for implementing directives such as 4000.8. In effect, the service secretaries are required to see to it that existing departmental directives are modified in accordance with the instructions included in 4000.8.

These modifications are carried out in the Army largely by the civilian and military executives

who have been delegated responsibility for supply management.

D. SUPPLY MANAGEMENT AT DEPARTMENT OF THE ARMY LEVEL

1. The Secretary of the Army

The responsibility and the authority of the Secretary of the Army within the Department of the Army are akin to those exercised by the Secretary of Defense for the military establishment as a whole. The Secretary of the Army is responsible for all aspects of the military mission delegated by the Secretary of Defense to the Department of the Army. Like the Secretary of Defense, the Secretary of the Army has been granted broad powers by Congress in order to provide the administrative flexibility essential to managing the complex business of the Army.

2. The Under Secretary of the Army

The Under Secretary of the Army acts as Deputy to the Secretary of the Army and is his principal civilian assistant in the field of general management. The Under Secretary serves as Executive Secretary of the Army Policy Council and as such is responsible for its overall direction.

3. The Assistant Secretaries of the Army

There are Assistant Secretaries of the Army for Financial Management, Civil-Military Affairs, Logistics, Manpower and Reserve Forces. The Director of Research and Development holds a position roughly coequal with the Assistant Secretaries. The Assistant Secretary of the Army (Logistics) has the following assigned areas of responsibility: procurement of materiel and services; production; materiel supply and maintenance; industrial mobilization; industrial labor relations; Army participation in the Mutual Defense Assistance Program; claims; command, industrial and civil real property; housing and public quarters; military construction, communications, medical, transportation, and other service activities of the technical services; Army Contract Appeals Panel; and Army Contract Adjustment Board.

Unlike the Assistant Secretaries of Defense, the Assistant Secretaries of the Army may act

for the Secretary within their specific areas of responsibility.

The Assistant Secretary of the Army (Financial Management) is responsible for general management, control, comptrollership and review and analysis of programs and budgets. He has been designated as the Secretary to whom the Comptroller of the Army reports. In this capacity the Assistant Secretary has supervisory and review authority over the preparation of the Army's primary programs and budgets, and is responsible for the execution of the primary programs.

4. The Chief of Staff

Under the direction of the Secretary of the Army, the Chief of Staff supervises the operation and administration of all activities of the Army. The Chief of Staff directs programming with the assistance of the Vice Chief of Staff who coordinates the development, execution, and review and analysis of programs. Following the Chief of Staff's approval of the Army Strategic Objectives Plan, which is prepared under the supervision of the Deputy Chief of Staff for Military Operations and which forms the basis for Army programming, the Army Staff evaluates the plan in terms of force levels and objectives. The Army Staff converts the force levels and objectives into a summary (order of magnitude) budget in terms of direct obligations for each major Army appropriation. Following review and necessary adjustments by the Chief of Staff and the Secretary of the Army, the force levels, objectives, and dollar evaluation become the basis for program and budget development. They are published by the Chief of Staff in an annual Control Program Directive which provides the approved program guidance on objectives, dollar targets, special assumptions and other supplemental information necessary for the preparation of Control Programs.

5. Deputy Chief of Staff for Logistics

At the Department of the Army level, the Deputy Chief of Staff for Logistics is responsi-

ble for planning the supply support necessary to implement the strategic plans and for the economical and effective accomplishment of supply operations within the technical services. He is also charged with directing and controlling the technical services in the performance of their supply missions. This control is exerted in the form of directives outlining supply policy and procedure as well as through inspection visits to supply installations. All communications on supply matters which are directed to the technical services from levels above DCSLOG as well as questions directed up from the technical services to the Chief of Staff or to the Secretariat must pass through the Office of the Deputy Chief of Staff for Logistics. Thus the Deputy Chief of Staff for Logistics occupies a key position in the supply system. He must translate the broad policy from above into operating procedure for the technical services; moreover, the missions of the technical services must be coordinated by DCSLOG in order to insure that they conform with the supply management objectives established at the level of DCSLOG and above.

This element, directing and coordinating the technical services, is a vital link in the Army's supply organization.

6. Technical Services

a. Introduction. It is the technical services which bear the burden of operating the supply system. These seven services are organized around major commodity and service groupings; *for example*, the Signal Corps is responsible for supplying communications equipment and the Chemical Corps supplies both weapons of a chemical nature and devices to protect personnel and equipment against chemical attack. Within each of the services, there are activities specializing in a supply function, such as procurement or stock control.

The technical services are established and experienced in their assigned jobs. Their basic commodity-type organization is similar to the way that many prominent corporations are organized; indeed many corporations have shifted from a "functional" to a commodity-type organization. In appraising these two types of organizations, the Report of the Ad-

visory Committee on Army Organization points out that "The controlling consideration . . . is whether the advantage of greater specialization, coordination and uniformity with respect to a function (e. g., procurement) is more important than the need for coordinating and resolving all differences between functions with respect to an item (e. g., tanks)." The committee concludes that "Coordination of the development, procurement, and distribution of an item is a more meaningful basis for organization . . . than specialization in each function. The present technical services' organization is designed to achieve that primary coordination."

The commodity specialization of the technical services affects to some extent the methods and procedures by which they operate; the Ordnance Corps, *for example*, by virtue of the nature and the size of its inventory, controls and distributes stock somewhat differently from the other technical services. The fact that the services are in large measure independent organizational entities also accounts for many of the current differences in procedures and paper work.

Despite their organizational and procedural differences, the technical services are marked by a broad degree of similarity. All seven services compute requirements, procure, store, distribute and maintain the items for which they are individually responsible. They do serve the same troops and fight the same wars. To facilitate DCSLOG, direction and control, the services are required to utilize the same basic reporting structure.

Because the technical services bear the major responsibility for operating the supply system, it is desirable at this early point in the manual to summarize briefly the supply missions of each of the services. An indication of how the overall supply system operates is presented in chapter 3.

b. Ordnance Corps. Ordnance is by far the largest of the technical services by any commonly accepted supply standard of measurement. The inventory for which Ordnance is responsible exceeds the combined total of the inventories of the other six technical services. Ordnance supplies the following kinds of items:

- (1) Weapons and ammunition (except chemical).

- (2) General purpose vehicles.
- (3) Special purpose and special equipment vehicles.
- (4) Combat vehicles.
- (5) Fire control instruments.
- (6) Spare parts, assemblies, tools and cleaning and preservative materials necessary to the maintenance of all Ordnance equipment except general transport administrative vehicles.

The Ordnance Corps provides the following kinds of service:

- (1) Maintenance and repair of all Ordnance equipment and materiel.
- (2) Collection and dissemination of technical information relating to the operation and maintenance of Ordnance materiel and the materiel of allied and enemy nations as necessary.
- (3) Collection, evaluation and dissemination of Ordnance technical intelligence concerning enemy Ordnance materiel.
- (4) Disposal of ammunition and ammunition components, explosives, duds and unexploded or delayed action bombs (except booby traps and land mines).
- (5) Inspection of Ordnance materiel and ammunition.
- (6) Specialist training of Ordnance personnel and troop training in preventive maintenance, servicing, characteristics and limitations of Ordnance equipment.
- (7) Establishment of standards of serviceability for Ordnance equipment.
- (8) Furnishing technical advice and assistance concerning safety in processing, handling and storage of Ordnance materiel.

The principal field installations employed by the Ordnance Corps in accomplishing its mission include ammunition depots and supply points, Ordnance general supply depots, arsenals, vehicle and artillery parks, maintenance shops, collecting points, Ordnance schools and training centers. The principal troop units include:

- (1) Command and control units, including Ordnance group and battalion head-

quarters and Ordnance headquarters detachments.

- (2) Supply units, including Ordnance ammunition companies, depot companies, vehicle and artillery park and distributing units and industrial personnel.
- (3) Maintenance units, including Ordnance direct support and heavy field maintenance companies, division maintenance battalions, heavy (fixed) shop units, tire repair companies and detachments and special maintenance teams.
- (4) Miscellaneous units, including Ordnance recovery and evacuation units, salvage and reclamation companies, bomb disposal squads, ballistic teams, technical intelligence teams, ammunition renovation companies and detachments and special instruction teams.

Naturally, the demand for the materiel supplied by all the technical services undergoes a substantial increase with the increased activity of mobilization and war. This is particularly true of Ordnance supply because of the nature of Ordnance materiel; ammunition provides an obvious example. Furthermore, many Ordnance items have long production lead times. These are the complex items such as tanks and fire control equipment which in time of mobilization limit the speed with which combat troops can be put into the field. For these reasons mobilization planning plays a central role in Ordnance supply.

The disparity between the peacetime and the wartime rates of consumption has a significant effect on the problems of Ordnance supply. Someone has said that when wars end—depots bulge. When these depots are bulging with Ordnance items, as was the case at the end of World War II, the peacetime supply system is seriously handicapped by these excesses which can neither be immediately consumed by the troops nor sold to the public.

c. Quartermaster Corps. The Quartermaster Corps has a supply responsibility associated with the welfare of the individual soldier. With the exception of the Army Medical Service, none of the Army's technical services is so vitally concerned with this function. Other Army sup-

ply services necessarily concern themselves with tanks, guns, bridging equipment, trucks and communications systems. The Quartermaster Corps, to cite only two aspects of its mission, is concerned with the clothes the soldier wears and the food the soldier eats.

Among the technical services, the Quartermaster is the oldest. General depots are under the jurisdiction of the Quartermaster General.

Quartermaster supplies the following kinds of items:

- (1) Subsistence.
- (2) Clothing and equipage.
- (3) General supplies.
- (4) Petroleum products.
- (5) Furniture and office supplies.
- (6) Laundry and kitchen equipment.
- (7) Air items (parachutes, aerial delivery kits, etc).
- (8) Materials handling equipment.
- (9) Repair parts for the items shown in (2), (3), (5), (6), and (8) above.

The services provided by the Quartermaster Corps include the following:

- (1) Maintenance of Quartermaster items.
- (2) Storage of bulk petroleum.
- (3) Disposition of remains of deceased military personnel.
- (4) Overall supervision of national cemeteries.
- (5) Food service program supervision; this includes the training of personnel for post bakeries, central pastry bakeries, central meat cutting, refrigeration, commissary sales stores, menu planning, and mess management.

The principal field installations include Quartermaster supply points, Quartermaster depots, labor pools, sales commissaries, laundries and dry cleaning plants, bakeries and other installations necessary to perform Quartermaster services, including Quartermaster schools and training centers. The principal Quartermaster troop units are:

- (1) Command units, including headquarters and headquarters company Quartermaster base depots, Quartermaster

group headquarters, and Quartermaster battalion headquarters.

- (2) Supply units, including mobile petroleum supply companies, subsistence supply companies, depot supply companies, headquarters companies, depot, and petroleum depot companies. Division Quartermaster units, because of their supply functions, may also be included in this category, but they provide in addition to supply such services as parachute supply and maintenance, salvage collecting, laundry, troop bathing and graves registration.
- (3) Service and maintenance units, including bakery companies, laundry companies, salvage companies, refrigeration companies (mobile), bath companies, aerial supply companies and air item repair and depot companies. Special hospital laundry detachments, office machine repair detachments, base and mobile petroleum products laboratories, drum cleaning detachments, drum filling detachments and clothing equipment and repair detachments are also included in this category.
- (4) Miscellaneous units, including mobile sales companies.

Unlike the supply problems of Ordnance, which center around the activities in which the troops are engaged, the supply problems of the Quartermaster are directly related to the troops themselves. A soldier eats approximately the same quantity of food and wears the same number of the same size of shoes regardless of his activities. But shifts in troop strength affect the Quartermaster Corps more quickly than any of the other technical services. For most soldiers, military life begins at the end of a long line in which they receive such Quartermaster supplies as food or clothing. For the duration of his military service, the soldier will in all probability draw Quartermaster supplies every day. If he dies while in the Army, the Quartermaster will dispose of his remains and care for his grave if he is buried in a national cemetery.

While soldiers are clothed and fed alike, many of the Quartermaster supply problems arise

from differences which exist between individual soldiers. There are, *for example*, a great many combinations of shoe lengths and widths. In order to prepare for increases in troop strength and for rapid replacement demand for Quartermaster items, it is necessary to forecast the size distribution as well as the total demand.

d. Corps of Engineers. Corps of Engineers operations differ markedly from those of other technical services. Principal responsibilities are in the areas of construction, rehabilitation, real estate and supply. In accomplishing its construction and rehabilitation missions, the Corps of Engineers is the major consumer of the items for which it has logistic responsibility, differing in this respect from some of the other technical services. The Engineers have a civil works function. Of the technical services, the Engineers are most likely to be used as combat troops. The Corps of Engineers supplies the following kinds of items:

- (1) Construction equipment and supplies.
- (2) Bridging equipment, including boats as necessary in construction.
- (3) Fortification materials.
- (4) Petroleum distribution equipment, such as pipelines and large storage tanks.
- (5) Certain industrial gases.
- (6) Fixed refrigeration and air conditioning equipment.
- (7) Surveying equipment, maps, and map reproduction equipment.
- (8) Water purification and distillation equipment.
- (9) Camouflage materials.
- (10) Repair parts for the items shown in (1) through (9) above.

The Corps of Engineers provides the following kinds of service:

- (1) Maintenance of Engineer equipment.
- (2) Design, construction, rehabilitation or repair and maintenance of structures of every character with the exception of telegraph and telephone systems and other communication equipment. This mission includes the building and maintenance of roads, bridges, shelters, airfields, wharves, piers and jetties and permanent fortification.

- (3) Construction and rehabilitation of railways.
- (4) Clearance of obstacles including minefields.
- (5) Installation and maintenance of fixed refrigeration plants, pipelines, water purification and distillation systems and utilities not specifically assigned to other arms or services.
- (6) Providing waterborne transportation in inland amphibious operations.
- (7) Operation of beach and port maintenance areas from the time of landing onward.
- (8) Surveying, mapping, and the production of maps.
- (9) Photographic work related to terrestrial reconnaissance and Engineer terrain intelligence.
- (10) Supervision and inspection of camouflage technique.
- (11) Operation of sawmills.
- (12) Dredging operations.
- (13) Furnishing utilities.
- (14) Fire fighting and fire prevention.
- (15) The acquisition and disposal of real estate, including land, buildings, docks, wharves, office and storage space, quarters for individuals, organizations and detachments.
- (16) Training of Engineer personnel and dissemination of technical information in the use and maintenance of Engineer equipment.
- (17) Providing advice and assistance to troop units other than Engineer units who, during combat operations, are required to engage in construction and fortification and in the assault of fortified positions.

The principal field installations include depots, supply points, maintenance shops, pipelines, water purification and distillation installations, general utilities establishments and Engineer schools and training centers. The troop units with which Engineer accomplishes its missions include the following:

- (1) Command units, including headquarters, Engineer command, Army; head-

quarters, Engineer brigade, Corps; headquarters, Engineer brigade; and headquarters, Engineer aviation brigade.

- (2) Combat units, including Engineer combat groups and battalions, armored Engineer battalions, airborne Engineer battalions, and bridge units.
- (3) Construction units, including Engineer construction groups and battalions, Engineer aviation groups and battalions, Engineer equipment companies, Engineer dump truck companies and Engineer pipeline companies.
- (4) Maintenance and supply units, including Engineer maintenance and supply groups, Engineer maintenance battalions, Engineer depot battalions, Engineer field and base maintenance companies, Engineer depot companies, Engineer parts companies and Engineer equipment supply companies.
- (5) Topographic units, including Engineer Army and Base topographic battalions, Engineer topographic companies, Engineer Base map distribution companies and Engineer technical intelligence teams.
- (6) Miscellaneous units, including Engineer water supply companies, Engineer camouflage battalions and various teams of the Engineer service organization.

The supply problems of the Corps of Engineers are closely related to the Engineer construction and maintenance mission. Over 60% of Engineer supply falls into class IV (special projects). These special projects range from constructing a port with all the necessary dock facilities, roads and structures to preparation for the supply and installation of flood gates for the Inchon reservoir in Korea. Effective execution of these projects involves careful logistical planning and a high degree of coordination among diverse elements. Since these projects are frequently the end result of an emergency situation, the time available for planning must frequently be abbreviated. At the present time the Corps of Engineers has developed a functional component system to meet the need for a rapid system of computing the requirement for both individual

projects and for the total class IV supply demands. The component parts of a port in a particular size range, *for example*, are prepared to serve as a standard. When the demand arises for a port in the given size range, supply planning will consist of modifying the standard plan to meet the needs of the particular situation. Forecasting total class IV demands is a matter of estimating the number and the kind of projects which the Engineers will be called upon to provide during the period covered by the forecast. This method will probably be no less accurate than the old method of item-by-item forecasting and it will save a significant amount of time and work in preparing requirements estimates.

Along with Ordnance, the Corps of Engineers bears the brunt of the repair parts problem. Because of the large number of makes and models of mechanical equipment, the number of repair parts which must be maintained and supplied is huge. With only about 25,000 end items, the Engineers supply over 170,000 repair parts. At the Yokohama depot in 1951, *for example*, it was found in the course of a gasoline engine overhaul program that the depot contained 350 different makes and models of gasoline engines. In many instances the parts were not interchangeable and in some cases the manufacturer had either gone out of business or no longer manufactured parts for the particular model of engine.

To overcome the situation described in the above example, the Corps of Engineers now has under development, a family of small size military-type engines. This program, together with Industry Preparedness Measures, will eventually eliminate many commercial makes and models from the supply system and provide longer engine life, interchangeable parts, improved production methods and standardization.

e. Chemical Corps. Over 90% of the items supplied by the Chemical Corps are military in nature. They consist of weapons such as flame-throwers and toxic bombs and shells, as well as protective devices against chemical weapons such as gas masks, impregnated clothing and shelters. Because of the nature of Chemical items, supply management must, in one sense, be carried on in a vacuum. Many of the items supplied by Chemical have never been issued, while others

such as gas masks must be forced upon the troops. For most of the items in Chemical supply there is no normal demand. One of the critical problems in Chemical supply management is forecasting the potential demand for items which have never been issued and effecting technological development in equipment which has never been used. In terms of dollars most Chemical supplies are consumed by the Air Force. The Air Force determines requirements, budgets, and provides funds while the Chemical Corps procures, stores and issues, except in the overseas theaters where the Air Force itself stores and issues the items supplied by Chemical.

The Chemical Corps supplies the following kinds of items:

- (1) Chemical weapons, such as gases and vesicants.
- (2) Chemical ammunition.
- (3) Protective devices against chemical and biological weapons.
- (4) Certain common chemicals.
- (5) Repair parts for the items shown in (1) through (3) above.

Chemical provides the following kinds of services:

- (1) Decontamination services to units and installations in excess of that normally performed by the individual units.
- (2) Processing services including impregnation and reimpregnation of clothing and equipment in bulk for reissue.
- (3) Laboratory services, including the examination and analysis of captured materiel and surveillance of supplies and equipment.
- (4) Dissemination of technical information pertaining to chemical warfare.
- (5) Furnishing technical advice and assistance concerning safety in the processing, handling and storing of Chemical materiel and in chemical operations.
- (6) Training of Chemical Corps technical personnel for performance of specialized duties.

The principal field installations include supply points, Chemical schools, Chemical training centers, impregnating plants, maintenance shops and depots.

The principal troop units include the following:

- (1) Command units, including Chemical base depot headquarters and headquarters company, and Chemical platoon, company and battalion headquarters.
- (2) Combat units, including Chemical smoke generator battalions.
- (3) Maintenance and supply units, including Chemical depot companies, Chemical base depot companies, Chemical base depot and maintenance companies, Chemical maintenance companies and various depot and maintenance teams.
- (4) Miscellaneous units, including Chemical processing companies, Chemical base processing companies, Chemical decontamination companies, Chemical laboratories and special decontamination, processing and intelligence teams.

f. Signal Corps. The Signal Corps is the communications, electronic and photographic expert for the arms and services of the Army. It also supplies ground communications for the other departments of the armed forces. Like Engineers, the Signal Corps has a dual mission and Signal consumes a substantial quantity of the items for which it has supply responsibility. The items supplied by Signal include the following:

- (1) Tactical radio, certain types of radar, telephone and telegraphic communications and detection equipment, and supplies and parts for all such equipment.
- (2) Fixed radio, telephone and telegraph communications systems.
- (3) Meteorological equipment supplies.
- (4) Photographic equipment and supplies.
- (5) Repair parts for the items shown in (1) through (4) above.

The services provided by Signal include the following:

- (1) Installation, maintenance and operation of all Signal communications and electronic systems and equipment (except communication systems within regiments and similar units of the other arms and services and certain Air Force communication systems).

- (2) Photographic work (except for Navy and Air Force).
- (3) Cryptographic work.
- (4) Maintenance and repair of all items of Signal supply.
- (5) Training of Signal specialists and training in the operation of Signal equipment for Signal troops and for other troops using this equipment.

The principal field installations through which the Signal Corps accomplishes its mission include wire and radio networks, electronic systems, engineering laboratories, radio stations, Signal centers, Signal procurement and stock and supply control centers, Signal depots, Signal maintenance shops, photographic laboratories and film libraries and Signal schools and training centers. The principal troop units include the following:

- (1) Field service units including: division Signal company; Signal battalion, corps; Signal battalions, operations; Signal battalions, support; Signal battalions, electronic warfare; Signal battalion, construction; Signal company, depot; Signal company, repair and Signal radar maintenance units.
- (2) Base service type units including: headquarters company, base depot; Signal base depot companies; Signal base maintenance companies; Signal battalion, theater headquarters; and miscellaneous Signal units, such as: installation company; large base company; long lines company; medium base company; message center company; Signal photo company; radio company; radio relay company and telephone and telegraph operations company.
- (3) Miscellaneous units including: Signal pigeon company; mobile broadcasting company and various special purpose technical teams for intelligence, radio propagation and meteorological activities.

The dollar volume of Signal supply is smaller than that of Ordnance and Quartermaster and is comparable to that of Engineers. But the equipment supplied by Signal is of a highly technical nature creating difficult supply and maintenance problems. Repair and maintenance of Signal

equipment requires technical skill and training. In order to minimize the degree of skill required by the users and by the lower echelons in the maintenance organization, Signal uses a system of kits and assemblies of component parts to a far greater degree than any of the other technical services. While this reduces the problems of maintenance and training, it increases the difficulty of supply. The component parts of the kits and assemblies must be consolidated at one point for assembly prior to distribution throughout the system and the component parts of the assemblies must be supplied to the points in the maintenance organization where the assemblies are themselves overhauled.

g. Army Medical Service. Army Medical supply is similar to Ordnance supply in that the demand may be expected to increase markedly with combat operations. But like Quartermaster, Medical is concerned with the welfare of the individual soldier, and to an even greater degree than Signal or Engineers the Medical supply mission is of subsidiary importance to its other activities. The Medical Service supplies the following kinds of items:

- (1) Medical, surgical, veterinary, and dental supplies.
- (2) Medical, surgical, veterinary, and dental instruments.
- (3) Drugs, medicinal chemicals, plasma and whole blood.
- (4) Field medical equipment such as hospitals and dental laboratories.
- (5) Repair parts for the items shown in (1), (2) and (4) above.

The principal services performed by the Medical Service include:

- (1) The care of the sick and wounded.
- (2) Nutrition.
- (3) Sanitation surveys and inspections.
- (4) Training of Medical personnel.

The principal troop units of the Medical Service include:

- (1) Command units, including headquarters and headquarters detachments, Medical group; headquarters and headquarters companies, Medical battalion and headquarters hospital center.
- (2) Evacuation units, including Medical

battalions of infantry, armored and airborne divisions; Medical companies, infantry regiments, Medical clearing companies, Medical ambulance companies, Medical gas detachments, Medical holding companies and Medical ambulance hospital trains.

- (3) Hospitalization units, including evacuation hospitals (750-bed), semimobile evacuation hospitals (400-bed), convalescent center Army or communication zone hospitals, general hospitals and station hospitals.
- (4) Maintenance and supply units, including Medical supply detachments, Medical depot, depot communications zone, Army Medical depots, Medical general laboratories, communications zone and Medical field laboratories Army.
- (5) Miscellaneous units, including miscellaneous teams, such as Medical headquarters, professional, veterinarians, supply, maintenance, optical, and food inspection.

h. Transportation Corps. The Transportation Corps is wholly occupied in the field of logistics. In addition to the service it performs in moving men and materiel, it also has supply responsibility for aviation, marine and rail items used by the Army.

Transportation supplies the following kinds of items:

- (1) Army aircraft and allied equipment except communications.
- (2) Marine floating equipment except dredges, assault boats, bridge power boats and construction barges assigned to the Corps of Engineers.
- (3) Military rail equipment.
- (4) Certain cargo handling equipment and certain petroleum handling equipment.
- (5) Repair parts for the items shown in (1) through (4) above.

Transportation Corps performs the following services:

- (1) Transportation of persons and things.
- (2) Operation of cargo helicopter units in support of tactical or logistical operations and heliports.

- (3) Water operation on inland waterways, operation of ports, water terminals, and marine repair facilities.
- (4) Operation of military railways, railway shops, and railway terminals.
- (5) Operation of highway transport, repair shops, highway terminals, and administrative motor pools.
- (6) Operation of supply depots and depot maintenance facilities.
- (7) Operation of staging areas armywide, transportation schools and training centers.
- (8) The training of Transportation specialist personnel, Army aircraft maintenance personnel and other armed forces personnel including personnel of allied countries in the use of the Transportation equipment.

Principal Transportation field installations include: Army Terminals, supply depots, repair shops, administrative motor pools, schools and training centers. The principal troop units include the following:

- (1) Command units, including transportation terminal commands, transportation railway commands, transportation motor transport commands, transportation group headquarters, and transportation battalion headquarters.
- (2) Service or operating units, including transportation truck, boat, terminal service, amphibious trucks, helicopters, railway battalions and companies.
- (3) Supply and maintenance units, including transportation depot companies as well as railway shop, boat maintenance, and helicopter maintenance battalions and companies.
- (4) Miscellaneous units, including movement control companies and teams and staging area companies.

7. United States Continental Army Command

Although it is primarily a training command, the USCONARC function of direction, supervision, and coordination of matters pertaining to development of tactics, organization, doctrine and materiel blueprints the outline within which the chain of supply must be designed. The needs

and desires of the fighting forces determine in large measure the types of new equipment to be developed. The Office of the U. S. Continental Army Commander is the agency that insures that troop needs are accorded adequate recognition; this is achieved by means of the Development and Test Branch, its field testing boards, and Arctic Test Branch. The boards work with representatives of the technical services, the combat arms, science and industry in developing and evaluating new equipment and modifying existing equipment.

From a supply management standpoint, the U. S. Continental Army Commander's work is often of central importance. Although its first concern is combat effectiveness, USCONARC representatives must also think in terms of the dollar sign. *For example*, a modification in a standard item, say a truck, may increase the comfort of the driver but it may add appreciably to the truck's cost, since the standard truck production line will have to be modified. The USCONARC also plays a part in the decision to replace existing items of equipment with new and improved versions. Here the cost of rendering existing equipment obsolete must be weighed against the advantages of the new model.

8. Troop Units

Supply exists for only one purpose—to support troop units in combat and training for combat. Thus, supply managers at all levels must appraise their operations in terms of the degree to which they meet troop needs adequately. *For example*, new items should be developed with the problems of the soldier in mind; a flat can, *for example*, can be carried more easily on the soldier's person than a round can.

The paper work of the supply system must also be constantly examined in terms of facilitating the task of the unit supply officer. In this connection, the commodity specialization of the technical services sometimes presents problems at the using level. A unit supply officer is in-

terested in obtaining a needed item of equipment; he is less interested in which technical service is responsible for supplying the item. This problem may be eased to some extent, particularly with respect to common-use items, when the Federal Identification Number is assigned. Since the paper work and procedures of supply vary to some extent among the services, it is often necessary for the unit supply officer to be familiar with several systems of requisitioning.

Although supply activities exist to support troop units, the troop units themselves must bear a proper share of the responsibility for effective supply. This responsibility was well stated by the Assistant Chief of Staff, G-4 in an article appearing in the April 1953 edition of the *Army Information Digest*:

"It appalls me to think how many failures occur in the last link of the logistic chain. Equipment is manufactured at great expense. It is shipped 5,000 miles by train, ship, and truck. It is issued to the troops and eventually may with great labor be carried to the top of a mountain in Korea. How many times, at that last point, has the whole enormous effort been thrown away as carelessly as a burnt match by the happy-go-lucky negligence of the very people whose lives depend on their keeping the stuff in shape?"

9. Implication of Atomic Warfare

Dispersion, duplication of resources, mobility, and speed of communication take on vastly increased importance in atomic warfare and in a climate of possible mass destruction. The extent to which those principles are applied is a matter of calculated risk balancing between combat necessity on one hand and capabilities and resources on the other. In support of the shifting weight on tactical principles, systems to achieve greater dispersion and duplication of supplies and facilities, and to gain mobility and speed of communication are being considered and tested. Supply managers must be alert to the importance of guidance evolving from such tests.

E. CONCLUSION

Effective supply is everyone's responsibility. The degree to which this responsibility can be exercised depends on the position of the individual. Formal responsibilities for policy and

for operations are delegated down through successive tiers of management. At each level the task of supply management is further subdivided while the formal responsibility for coordination

and direction is retained in the level above. The commander may delegate duties to his staff, administrative and operating subordinates, but he retains personal responsibility for their successful management. This responsibility embraces the obligation to effect improvements in the supply system. While policy emanates from

higher echelons, defects in the system or opportunities for improvement can sometimes be detected most readily by individuals working at operating levels. It is their responsibility to direct the attention of their superiors to the methods or functions susceptible to improvement.

PART II

MANAGEMENT OF ARMY SUPPLY

CHAPTER 3

STORAGE, DISTRIBUTION, AND CONTROL OF STOCKS

A. SUPPLY SYSTEM AND ITS CUSTOMERS

1. Introduction

The size of the Army supply system is equaled by the complexity of its operations. The supply of some critical items is planned and controlled at the highest level in the Army supply organization, or even by the Secretary of Defense. Other common items are left to the discretion of the local supply officer at an Army post. Supplies in heavy demand cannot be controlled in the same way as those which are relatively slow moving. Even the same item may be supplied in different ways, according to its eventual disposition as an independent end item, as a repair part for another end item, or as a component of a set or kit. At the same time all the varying processes of supply have a common end, to support the Army's current or planned operations, and all have a more or less integral relationship with each other.

To provide for the management of its supply operations the Army generally breaks down the whole process of supply into segments or functions constituting the components of the supply cycle:

- The computation of supply requirements;
- The procurement of required supplies;
- The storage and distribution of supplies to meet the needs of the consumers.

Traditionally the basic components of the supply cycle are taken in the order presented above, with requirements at the head of the list, followed by procurement and distribution. This is the sequence in which plans, directives, and the goods themselves move from the strategic plan and the research laboratory to the consumer and presentation of the material in this order has a

logical appeal. This manual, however, deals with the management of an operating supply system in which the supply cycle may be encountered in many different stages and forms at any given moment. The interrelationship of requirements, procurement, storage, and distribution at all levels makes it impossible to manage any one function as an element isolated from the others.

In this chapter distribution is discussed in its broadest sense, covering the whole process of channeling material from stock review and replenishment to its ultimate consumption. The chapter begins with a description and analysis of the consumers or customers of the supply system and of the organization and distribution pattern set up by the Army to meet their demands. It then traces the consumer demand for goods through the post, camp, or station to the supply depot and ultimately to the inventory control point. At each of these levels in the supply system the responsibilities of management are discussed and distinguished.

Following this comprehensive treatment of distribution with its related functions, this part of the manual continues with chapters on the special areas of requirements planning and the contribution of procurement to supply management. It then takes up separately the subjects of cataloging, maintenance and repair parts, the disposal of stocks in excess of needs, and finally the establishment and use of management controls.

2. Customers of the Supply System

a. General. In an overall view the customers of the Army supply system are a surprising aggregation. They include the Active Army in

the continental United States and overseas, the National Guard, the reserve components such as the USAR and ROTC, other branches of the military establishment (Navy, Air Force, Marine Corps), other Government agencies, other governments receiving military aid, industry (Government-furnished property), civilian agencies (emergency relief), and the general public upon occasions of disasters such as floods. Flags and blank ammunition are also provided to the public for ceremonies. These customers draw supplies for many purposes under many rules: they may have free issue or have to reimburse the Army; they may draw the supplies against allowance tables or for the purpose of installing them in a building; they may merely "borrow" the supplies for a brief period such as for housekeeping at a station; they may obtain the supplies for permanent addition to their equipment and for other purposes almost beyond tabulation.

The methods by which these customers place their demands upon the system also show many variations. The demand may be stated by an issue slip or by a requisition. In many cases supplies are issued "automatically," that is, without any active demand from the user at all.

b. Active Army.

(1) Troops in the continental United States.

The Active Army within the continental limits draws the great bulk of its supplies from the technical service property officers of posts, camps, and stations.

- (a) Troop units.* Troop units draw their basic equipment and supplies from the station in accordance with tables of equipment published by the Army. These are ordered through the unit supply officer or supply sergeant by means of an issue slip. During garrison duty authorized unit equipment may be reduced to the amount required for training and full equipment issued only when the unit is sent to the field. Troop units also draw various housekeeping items such as beds, desks, typewriters, and so forth which are required for the period of their garrison duty and training. These housekeeping items were formerly "loaned" to the units

on memorandum receipt but are now dropped from accountability by the station property officers and picked up on the "station property book" of the unit. However, such housekeeping items are assets of the station and must be returned by the units when they depart. Troop units also borrow many items from the station property officers for various purposes: generator sets to provide field lighting, tools to maintain the premises or to perform a certain repair job, etc. Troop units, particularly Engineer and Signal units, may draw class IV supplies to construct permanent or semipermanent installations. Troop units also, of course, draw large quantities of repair parts to maintain the equipment issued to them.

- (b) Overhead installations at Army posts, camps, and stations.* In addition to troop units at a station, various overhead installations such as hospitals, maintenance shops, bakeries, laundries, administrative offices, etc., draw some or all of their supplies from the station property officers. Property officers themselves use equipment and supplies furnished by more than one service. *For example,* the Engineer property officer furnishes generators, tractors, and other items to other property officers; the Ordnance property officer furnishes trucks and vehicles to other property officers; the Quartermaster property officer furnishes forklift trucks to other property officers; etc. Most of these overhead equipment items are carried on station property books by units and activities. The post engineer also obtains some of his equipment items on loan from station supply officers, although most of his expendable supplies are locally purchased at the station. Because the post engineer maintains a small stock of supplies of repairs and utilities items on hand, he might be termed an eighth supply officer at the sta-

tion, though he consumes his own supplies rather than issuing them.

(2) *Troops overseas.*

- (a) *Oversea requisitions.* All requisitions representing the demands of troops overseas are placed on the Oversea Supply Agency at New York, New Orleans, and San Francisco. Although we cannot cover the organization and operation of the supply system in overseas areas, it might be noted that, in general, overseas commands are organized into stations, depots, stock control points, and supply control points. The names that have been applied to these functions sometimes vary, but the functions are remarkably similar to those performed within the continental limits. The requisitions from the overseas commands are received by the Oversea Supply Agencies at the local Transportation Terminal Command designated to support each overseas command. The Oversea Supply Agencies are directly supervised by the Deputy Chief of Staff for Logistics.

In effect these Oversea Supply Agencies act as representatives of the overseas theater commanders in presenting the demands of overseas customers upon the supply system in the continental United States. Technical service personnel in each Oversea Supply Agency:

1. Edit the requisitions with their stated bases for supply against various criteria available to the agency, such as known strength of the command, mission, approved bills of materials for class IV projects, prior issue experience, etc.;
2. Break down the requisitioned items according to the initial source of supply designated by the technical service;
3. Prepare overseas extract requisitions to be sent separately to each source of supply (or purchase requisitions if the port has the facilities to accept

direct delivery from vendors and if the technical service has authorized OSA to go directly to procurement offices);

4. Maintain records of the status of overseas requisitions and conduct following-up liaison with the various sources of supply as to the status of requisitioned items in order to advise the overseas command when the items may be expected;
 5. Maintain close liaison with overseas commands by communications and visits to the commands.
- (b) *Automatic supply to overseas commands.* When a new overseas command or base is established, supplies and equipment are laid down for the first few months of the operation which are calculated on the basis of its mission and strength by the supply and stock control point. Shipping orders are then placed on depots and delivery of the supplies is phased with the Oversea Supply Agency at the Army Terminal. As the overseas command or base becomes established, the stock already received is picked up on its stock records. When demand experience is built up, the automatic supply is phased out and stocks are replenished by requisition. Some amount of automatic supply continues, however, for special categories of materials. *For example*, newly developed equipment may be shipped without requisition to designated theaters as it becomes available from manufacturer. However, repair parts for new equipment or for any substantial increase in older equipment population are computed and shipped in advance of the major items in order to integrate the supplies into the overseas commands without requisition and provide maintenance support for the major items concerned.
- (3) *Technical services.* Technical services requisition supplies from each other principally for the following purposes:

- (a) Set assembly, when the set is composed of items supplied by more than one technical service;
- (b) Maintenance and operation of overhead facilities that require Ordnance vehicles, Engineer cranes, and Quartermaster forklift trucks, to cite a few examples. This type of demand was discussed above as part of the demand placed on station supply officers. It may also originate, however, at depots, arsenals, or other installations of the supply system itself;
- (c) To install another service's item in a larger end item being assembled by a manufacturer, *for example*, an Engineer generator being installed in a radar set;
- (d) In connection with research and development.

c. Other Requisitioners. In addition to the Active Army located in the continental limits or overseas, there is a wide variety of other customers of the Army supply system which either add size to the problems of the Active Army or create problems of their own.

- (1) *Other governments.* The shipment of military supplies to other governments is either automatic or based on requisitions through the Oversea Supply Agencies. Automatic shipments predominate. The initial determination of which items will be furnished to the foreign government is performed by an Allocations Committee based on need, availability of the items, and the ability to support them. The Oversea Supply Agency then places requisitions both for the end items and the repair parts, tools, and equipment to support the end items, usually directly on the inventory control points of the technical services. However, the inventory control point generally must translate broadly stated "repair parts, tools, and equipment to support X number of the item for X period" into specific quantities of specific items. Shipping orders for the required number of major end items and computed repair parts, tools, and

equipment to support them are then placed on the depots for shipment to the Army Terminal. Replacement items are ordered by the foreign government through appropriate Oversea Supply Agency which follows essentially the same extract procedure as for Active Army supplies.

- (2) *National Guard.* Requisitions from National Guard units are submitted to the United States Property and Fiscal Officer for the State in which the unit is located. This officer is the accountable property officer for all Federal property issued to the National Guard of the State. The USP & FO submits consolidated requisitions to sources of supply designated by the technical service except for such items over which the Chief, National Guard Bureau desires to exercise centralized distribution control. In the latter case the USP & FO submits requisitions through the Chief, National Guard Bureau in Washington.
- (3) *Army Reserve and ROTC.* Army Reserve training centers (armories) with all Army Reserve units or activities assigned or attached thereto are satellited for supply on Active Army installations as designated by the ZI Army Commander. Unit requisitions are consolidated, if required, by the Training Center Supply Officer who forwards them to the technical service installation property officer for supply action. Supply is from station stocks, by local purchase or from technical service depots. Procedures are the same as for Active Army units, except that the Army Reserve customers are not physically located on the installation. Requisitions from ROTC units are submitted by the Military Property Custodian of the institution to technical service depots through Military District Headquarters for edit and citation of funds. One ZI Army area has been testing the system of satelliting ROTC unit on Active Army installations for supply similar to the Army Reserve. It is probable that this

system will be adopted Army wide in FY 1958.

- (4) *Other departments of the Military Establishment.* The Army furnishes the Air Force and Marine Corps with various items such as trucks, construction machinery, ground radio apparatus, and weapons. In the case of some technical services, this demand, particularly that of the Air Force, constitutes a sizable portion of the total supply workload of the technical service. The Navy obtains Army items to be supplied as Government-furnished property to manufacturers assembling Navy items that include Army components.
- (5) *Military attaches.* The Army furnishes supplies and equipment to military attaches at various foreign posts either from the nearest military depot or by requisition on the Zone of the Interior supply system.
- (6) *Civilian agencies and the public.* Under such emergencies as flood, drought, cold, famine, and pestilence the Army furnishes supplies to civilian agencies and the general public.

3. Operating Organization of the Distribution System

a. Operating Responsibilities. The primary aim of the Army supply is to meet the demands of its millions of customers scattered throughout the world and representing a wide variety of needs and activities. Chapter 2 of this manual has already discussed the organization of the system in terms of policy guidance passed down from the President and Congress to the Bureau of the Budget, the Department of Defense, the Department of the Army, and its supply activities. This section will concentrate rather upon the actual operations, the operators, and their responsibilities in the vast complex of personnel, equipment, and facilities that constitute the distribution system.

- (1) *Deputy Chief of Staff for Logistics.* The implementation of DoD policy guidance and the responsibility for day-to-day control of the system begins with the Deputy Chief of Staff for

Logistics. Except in emergency situations, however, and in certain well-defined areas of critical importance, such as operation of the Oversea Supply Agencies and control of specific major procurement actions, the Deputy Chief of Staff for Logistics does not perform any specific operating functions in the supply system but exercises direction and control over the technical services. Here he is responsible for the formulation of plans, policies, and procedures in the following areas:

- (a) Budget preparation and defense for supplies and equipment;
 - (b) Logistics plans;
 - (c) Mobilization plans;
 - (d) Materiel requirements;
 - (e) Procurement;
 - (f) Supply and service troops;
 - (g) Standards and specifications for equipment;
 - (h) Cataloging and identification of equipment;
 - (i) Storage and distribution system;
 - (j) Foreign and civilian aid;
 - (k) Construction; and
 - (l) Disposal.
- (2) *Heads of technical services.* The heads of technical services have both supervisory and operating responsibilities. As indicated in chapter 2 they are responsible both for supply and support of the commodity groups assigned to them. This involves the direct supervision of central procurement activities, inventory control points and depots. They also perform regular staff functions as subordinates of the Deputy Chief of Staff for Logistics. As indicated in chapter 2 they ticks and USCONARC of equipment tables for the items for which their respective technical services are responsible. In addition to these supervisory and staff functions, the regular operating phases of supply begin in the offices of the heads of technical services. They compute requirements for all principal items either independently or in coordination with their inventory

control points. Furthermore, the distribution of certain major items, known as "regulated items," is directly controlled by the heads of technical services or by inventory control points.

- (3) *Inventory control points.* An inventory control point is an organizational unit within the supply system of a military service which is assigned primary responsibility for the management of a group of items, either for a particular service or for the Department of Defense as a whole. This management responsibility includes computation of quantitative requirements; scheduling national programs of repair and rebuild; initiating procurement or disposal; developing worldwide quantitative and monetary inventory data; and the positioning and repositioning of materiel within the supply system.

In concept, each item of materiel for military or for industrial use within a military service, regardless of manner of acquisition, is under the cognizance of but one inventory control point of that service. Inventory control points carry out these functions among others:

- (a) They maintain a worldwide inventory of all items under their cognizance. In general, all items are inventoried at least once each year.
- (b) They channel flow of materiel into and through the distribution system in such a manner as to eliminate unnecessary cross hauling and back hauling and to minimize aggregate inventory holdings.
- (c) They take necessary steps to minimize entrance of nonstandard items into the supply system and take vigorous action to dispose of those nonstandard items currently in stock for which retention cannot be justified on the basis of known equipment or program application.
- (d) They phase introduction of new substituting items into the supply system so as to insure the maximum practical and economic utilization of the obsolescent items and their repair parts.

- (e) They review periodically the complete inventory status of each item under their control in relation to current and future demands for the item.

- (f) They determine the servicewide excesses of items under their cognizance unless such determination has been reserved to higher authority.

- (4) *Depots.* The depot is the basic storage and distribution point of the supply system. The *control* of receipt, storage, and issue of supplies, however, is only partially located in the depot itself. The inventory control points determine what items and what quantities the depot will receive. The depot permitted will in all cases fill requisitions upon it directly from stocks on hand. Many kinds of requisitions for all items and all requisitions for certain items must be approved by the inventory control point before the depot can issue the supplies. Unless specifically excepted, stockage levels at the depot are established by the inventory control point. The principal supply responsibilities of the depot in regard to receipt, storage, and issue of material therefore are the following:

- (a) To protect and preserve stock in storage;
- (b) To examine, or "edit", requisitions calling for supplies which it has authority to issue with respect to stock number, nomenclature, availability, substitution, and interchangeability and to correct obvious errors;
- (c) To package and ship the supplies in time to meet the required date on the requisition;
- (d) When requisitioned items are not available, either:
 - 1. To establish dues out for the item if stock is due in and release the dues out promptly upon receipt of the stock;
 - 2. To extract or report the shortage to the reserve depot or inventory control point; or

3. To procure the item under certain conditions if authorized to do so;
 - (e) To maintain accountable records of stocks in storage (except ammunition) by stock condition and prescribed accounting classifications (account codes);
 - (f) To maintain warehouse location records, to inventory physical stocks against book balances at periodic intervals, and to adjust inventory records to reflect actual stock on hand by proper conditions and accounting classifications;
 - (g) To repair and return to stock repairable items in accordance with prescribed schedules;
 - (h) To assemble sets, kits, and outfits from separately stocked items in accordance with instructions from the inventory control point;
 - (i) To make liaison visits to posts, camps, and stations served by the depot for the purpose of offering technical assistance in connection with levels and disposing of excess stocks;
 - (j) To inspect and/or examine supplies received from procurement.
- (5) *Posts, camps, and stations.* At each post, camp, and station, supply officers representing each technical service requisition, stock, and issue to troop units and other requisitioners the supplies for which their technical service is responsible. In the continental United States, the station stock rooms form the final link in the chain of distribution. Unlike the inventory control points and the depots, station supply officers are not under the administrative control of the heads of technical services but report through the chain of command to the Commanding Gen-

eral of the continental armies. They are subject to the technical control of the supply system, however, through the editing of requisitions, the examination of stock levels and the monitoring of excess stocks as described above. Limitations on amounts and items authorized for local procurement by the station, together with the form and frequency of requisitions and reports, are also prescribed by supply authorities through the chain of command. The supply responsibilities of stations are in many aspects parallel to those of depots and include:

- (a) Protecting and preserving stock in storage;
- (b) Maintaining accountable records of stocks in storage and checking physical stock on hand against inventory records at periodic intervals;
- (c) Issuing authorized supplies against issue slips presented by troop units at the station or by other authorized customers;
- (d) Maintaining authorized stock levels and replenishing inventories by placing periodic requisitions on the appropriate technical service source of supply;
- (e) Where items requested by an issue slip are not available in stock, either:
 1. Placing the items on due out against quantities due in or to be requisitioned from the depot;
 2. Procuring the item on the local station market, if authorized to do so;
- (f) Receiving supplies turned in for repair as excess by troop units and disposing of them as directed by the depot;
- (g) Maintaining stock fund and financial inventory accounting records at designated posts, camps, and stations.

B. MANAGEMENT PLANNING FOR DISTRIBUTION SYSTEM

1. Distribution Pattern

a. *Introduction.* Any descriptions of supply functions which are broad enough to include

the seven technical service headquarters, the dozens of inventory control points, and the 48-odd depots comprising the distribution sys-

tem in the continental United States must deal largely in generalities. To appreciate the actual management problems confronting the operators of the distribution system, it is necessary to examine the pattern of distribution set up by each of the technical services for the commodities which it handles. How and where do the technical services maintain their stocks? How is the distribution of these stocks controlled? How does consumer demand flow through the supply organization and how do the needed supplies return to the consumer? An understanding of the distribution pattern in these terms will define the basic management task of the Army supply system as a whole: to find the means for flexible yet adequate control of the huge volume and variety of supplies demanded to support the military mission.

b. Development of Distribution System. The basic unit of the system is the technical service distribution depot. This depot distributes technical service items to all customers, primarily posts, camps, stations, and ports of embarkation, in an assigned geographic area.

Depot stockage is determined by recurring demand for items and by a consideration of the economy and desirability of stocking items at the particular depot in question. Prior to World War II the technical service distribution depots, except ammunition depots and a few others, were generally housed together in five "general depots" at Schenectady, N. Y.; San Antonio, Tex.; Atlanta, Ga.; Columbus, Ohio; and Oakland, Calif. With few exceptions, stations placed their requisitions on the appropriate technical service section of the general depot. Distribution areas for the services generally conformed to each other.

This simple picture of distribution was rudely torn asunder by World War II. The tonnage of supplies and number of new items multiplied so rapidly that the general depots would not hold them. *For example*, the Corps of Engineers published a catalog in early 1941 with all of its items: 1,100. At the height of World War II, Engineers had 50,000 end items and about 200,000 repair parts. The five Engineer sections of the general depots became ten sections of general depots and six separate Engineer depots and seven subdepots. Huge quantities of stocks

were also held at 103 redistribution centers and a number of railroad ground storage yards. The expansion of the Engineers was matched or exceeded by all the other services. Highly complex new equipment entered all supply systems: radar, aerial map making equipment, complete hospitals, and mechanized equipment from landing craft to tanks to jeeps. No longer was it practical to attempt to store at one point every end item and repair part for a technical service. Specialization began: one depot specialized in large guns, another in tanks, another in subsistence, another in toxic chemicals, and so on. The expansion was so great that often more than one depot specialized in the same commodity. Because of their specialized functions, these depots came to be known as "key depots" for the commodities which they handled and were thus distinguished from "distribution depots," which handled a broad group of commodities for customers in a limited area. The distribution depot remained and even grew larger but no longer could it store and issue the whole range of commodities for a technical service. Both key and distribution depots were often given "satellite" or "reserve" depots to handle the overflow of their stocks. Reserve depots issued supplies only on orders from the master depots or the head of the technical service.

With this increase in items and tonnage came an increase in tempo: the Army had to know as quickly as possible what it had and where in order to meet the constantly shifting requirements of war. A reporting system was developed to meet this need. Every storage point transmitted its stock balances at varying intervals to the technical service headquarters where they were consolidated for an overall picture of stock availability. But the many other tasks that the war brought to the technical services soon forced them to move this central control of stock away from the congested Washington area to stock control points in various parts of the country. In many cases the technical service initially retained the computation of requirements function and merely moved out the day-to-day control of extracting between depots and related functions. Gradually, however, the computation of requirements for all but a few selected principal items and major secondary items was also delegated and supply control points

were dispersed throughout the country. These were often housed with the stock control points, but the two functions have usually been maintained intact.

The end of World War II caused a rapid contraction of both tonnage and number of items, together with abandonment of some depot facilities. However, the complexity of today's munitions and supporting equipment, together with the military demands of the present world situation, have put an end to this contraction and there can be no return to a few general depots storing the whole range of supplies for all services.

c. Management Problems in Distribution Pattern.

- (1) *Introduction.* The distribution patterns of the several technical services are not consistent. From divergent interpretations of the original concepts, such as the general depot or key depot, the present distribution system has developed. Not all the variations, of course, constitute problems for the overall management of the Army supply system. Many of them are based upon sound principles according to the different types of commodities handled by each service. In other cases divergences from original storage and distribution plans have been caused by the limited facilities available to the technical services at the time stock was received in large volume from procurement and from station or oversea returns. Many of the variations are the direct result of the impact of World War II upon the distribution system, followed by the Korean Conflict while the system was still wrestling with the effects of rapid demobilization and peacetime economies. These dislocations constitute recognized problems of supply management. They may be summarized under three principal headings: the mission of the general depots, the assignment of geographic areas to key and distribution depots, and the interpretation of key and distribution missions.

The distribution patterns of our supply system present problems of high importance to the supply manager. Are the most efficient and economical patterns for peacetime operations coincidental with the basic patterns we should establish to maintain readiness for war? How far should we go in seeking uniformity in technical service systems? What provision must we make for flexibility or for the ability to expand suddenly to meet suddenly imposed demands. Supply managers in the office of DCSLOG and in all the technical services work continuously at solution of these ever-changing problems.

- (2) *Mission of general depots.* At present no general depot has sections from all technical services. In some, a majority of technical services are represented but the supply mission of each technical service section is assigned independently by the technical service head. These missions may vary strikingly within the same general depot. The distribution areas served by two technical service sections, for example, may be very different. Again one technical service section may have a regular distribution mission, while another section at the same depot may have only a reserve storage mission as a satellite for another depot of the same technical service. Where the distribution mission of one technical service section includes an Army Terminal, the distribution missions of the other sections may not include the same terminal and these services may supply the terminal from other depots.
- (3) *Assignment of depot distribution areas.* As indicated above the geographic areas served by technical service depots, whether as sections of the same general depot or as branch depots located in the same region of the country, vary widely from each other. Generally there is no single geographic area within the continental United States that is supplied by all technical services in common. Simi-

larly, no Army Terminal is supplied by all technical services from the same location.

There appears to be little relationship between reserve and distribution depots located within the same geographic area. In other words the stockage at the reserve depot or depots in the same area does not necessarily complement or supplement the stockage at the master distribution depot.

- (4) *Assignment of key missions and distribution missions.* Every technical service has found it desirable to continue to a greater or lesser degree the depot specialization by commodities developed in World War II. Thus each service keys certain commodities or items to a single depot or to two or more key depots, each serving a designated zone broader than the coverage of a regular distribution depot. In some instances supplies are keyed by commodity class or end use, in others by frequency of issue alone. When the practice of "multiple keying" is followed the zoning of the continental United States, like the division of distribution areas, differs among the technical services.

In practice the methods of keying vary considerably from service to service. The keyed stocks are not always concentrated at the key depots or even at the satellites of key depots but may be found at distribution depots also. This pattern arises in part from the assignment of key missions after the stocks were already distributed widely through the system. Even after assignments were made, however, space limitations and other factors have dictated the distribution of keyed stocks to other than the appropriate key depots. Frequently, therefore, the key depots do not have a complete inventory picture of the stocks for which they are responsible, and requisitions for these stocks must be placed upon the inventory control point.

The criteria for selection of keyed items also vary between services. Some services select commodity classes. Other services select items for keying according to the end use made of the items. Still others disregard commodity classifications and end use and key items by frequency of issue alone.

d. Analysis of Depot Distribution Areas.

- (1) *Introduction.* The fact that depot distribution areas differ from each other does not by itself present any difficulty for supply management. Analysis of the distribution areas should be directed to economy in supply, which in this case means primarily economy of transportation. Potential savings in this area are considerable. The size of the expenditures suggests the importance of good planning and the maximum utilization of management techniques to keep these costs to the minimum. Transportation is a highly complex subject involving technical rules with respect to intransit privileges, documentation, packaging, routing, commodity classification for rating purposes, and fixing of responsibility for damages in transit. The transportation planning problems which fall within the scope of individual depot management, and the possibilities of direct shipment from manufacturer to consumer, are discussed later in this chapter. The effectiveness of individual depots, however, is limited by the degree of initial planning, on an inter-service basis, for the most efficient relationship between each depot, its customers, its sources of supply, and the other depots supplying the same customers. There are two principal areas of potential economies in the overall freight and transportation pattern: the maximum utilization of intransit privileges and the maximum consolidation of shipments.
- (2) *Intransit privileges.* With some exceptions, the intransit privilege may effect a reduction of freight rates

when a shipment is offloaded at an intermediate point between origin and destination and shipped on to its final destination within two years. The intransit rates apply only to carload or truckload lots. *For example*, the carload rate from Chicago to St. Louis may be \$1.50; from St. Louis to New Orleans, also \$1.50; but the rate from Chicago direct to New Orleans, only \$2.00. If a shipment is offloaded at St. Louis and then is shipped on to New Orleans within two years, the rate for the second shipment is only \$0.50 plus a small intransit charge of about 15%. This is obtained by subtracting the amount paid, \$1.50, from the through rate of \$2.00. Full utilization of this privilege can reduce transportation costs substantially. The situation of each depot should be analyzed in relation to the locations of its customers and its major sources of bulk supplies. If these supplies originate mainly in the Northeast, *for example*, they can be shipped more economically to bulk customers in the Middle West and West from a depot located between the source and the customer than from a depot located to the West of its customers. The rate differential is such that the "inbetween" location is more economical even if it is many miles further from its customers than the "outside" location. The proportion of bulk supplies and the consequent savings are particularly significant in the selection of depots to supply Transportation Terminal Commands.

- (3) *Consolidation of shipments.* Another freight cost consideration to be weighed in the assignment of depot service missions and areas is the rate advantage in shipping carload or truckload lots over shipping less-than-carload or truckload lots. This analysis applies particularly to general depots where shipments are made to customers by a number of technical service sections at the same location. If the customers of all technical service sections

are the same, that is, if the distribution areas for all sections of a general depot coincide and if all sections are assigned similar distribution missions, instead of independent reserve or key missions, consolidation of shipments into carload or truckload lots can be regularly accomplished at considerable savings. It may cost the government no more to ship a carload of 40,000 pounds than a less-than-carload lot of 15,000 pounds. To illustrate, the Gulf Transportation Terminal Command is supplied by the Quartermaster Corps and the Corps of Engineers from the Atlanta General Depot; whereas the Signal Corps, which uses Atlanta as a distribution point, supplies the Gulf Transportation Terminal Command from Decatur, Ill., and Lexington, Ky. In many cases it would be possible to combine Signal shipments with Engineer and Quartermaster shipments to New Orleans at no extra cost of transportation to the Government. If a single consolidated shipment of Engineer and Quartermaster supplies to New Orleans amounted to 15,000 pounds, another 25,000 pounds of Signal supplies could be shipped in the same car for no additional cost in transportation, subject to minor variations for differences in commodity rates.

Sometimes the cost advantages of consolidation must be offset against the use of intransit privileges, while in other cases both cost advantages may be used to reinforce each other. An overall analysis and reassessment of the types of missions and the distribution areas assigned to all depots of the Army supply system should yield measurable savings in transportation costs.

e. Assignment of Key and Distribution Missions.

- (1) *Need for specialization.* It has been brought out above that all technical services have adopted with some variations the concept of specialization

by one or more depots in certain items or commodities with a corresponding reduction in the responsibilities of the distribution depots. In general there is no distribution depot in any technical service that now stocks the full range of a service's items. It is probable that the statement could be expanded to say that there is no distribution depot in the system capable of handling a balanced stock of any service's whole range of items in view of the variety of storage facilities, materials handling equipment, space, and so forth that would be required. Under these premises the distribution depot cannot supply all needs of the requisitioners within its geographic area. Specialization is a necessity and it remains for supply management to use the conditions imposed upon it to develop an effective and economical pattern of distribution.

The two words just used, "effective" and "economical," may not always be compatible in military supply. The distribution system exists only for the purpose of supplying the Army with the things it needs to perform its mission. The urgency of the need can dictate speed and it often costs more to do something fast than to do it slowly. In all considerations effectiveness must be weighed against cost, although the element of cost may involve the men needed for another purpose and the dollars needed for another item.

- (2) *Keying by frequency of issue.* To provide effective supply to the consumer and to obtain economies in time and costs of storage, the largest possible proportion of consumer demand should be satisfied by the nearest possible point of issue. This basic rule indicates that the stockage in the distribution depots should represent to the maximum extent those items that are most frequently issued. Studies by a number of the technical services show that between 10% and 20% of the

items stocked by a service represent between 80% and 90% of the line item volume in the depot system. Selection of items for dispersed storage and issue upon the basis of frequency of issue offers the simplest method of designating distribution type items.

The criterion of frequency of issue, however, cannot be used exclusively for the selection of distribution items. Other factors must be considered in each case. Some of these are as follows:

- (a) What is the bulk of the item? Although an item may be relatively infrequently issued, its bulk and consequent transportation costs may suggest that the initial placement from the manufacturer should not be centralized. On the other hand, the item may be so small that it can be sent anywhere rapidly by parcel post.
- (b) Does the item require specialized storage? Such items as dry batteries, photographic film, toxics, and ammunition may require specialized storage that is not available in all distribution depots.
- (c) Does the item have a constant or urgent demand even though the number of issues is relatively small? In other words when the item is wanted it may be wanted faster than it can be supplied from a remote central location. Again the item may have a low issue frequency but a uniform rate of issue.
- (d) Is the item in the strategic reserve for wide distribution in an emergency even though current issues are relatively small? *For example*, gas masks may not be issued frequently but should be widely dispersed against emergencies.
- (e) Is the use of the item concentrated in certain geographic areas where stockage should be close to the consumer? It is not desirable, for instance, to stock snowplows in the Memphis and Atlanta distribution

depots, but they might reasonably be stocked in distribution depots at Schenectady, N. Y., and Ogden, Utah.

- (f) What is the requirement for dispersion of stocks of this item to obtain minimum vulnerability in the event of war?

Keying based upon frequency of issue, even when modified by these criteria, has certain drawbacks. For most items the frequency of issue will change over a period of time: a little-used part, for instance, may become a repair part for a new machine with a high rate of issue, or a heavily-used item may be in process of replacement by new equipment. If assignments of key and distribution items are constantly changed to reflect rates of issue, the problem of keeping all requisitioners, depots, inventory control points, Army Terminals, and other activities in the supply system informed of the changed status of the item reaches some magnitude. Further, the problem is posed whether the item should be moved physically from the key depot to the distribution depots or from the distribution depots to the key depot. If the demand for the item has increased, normal issues should exhaust the key depot of its stock. If the issue rate has decreased for an item that is widely distributed through the system, the problem is more difficult. Surplus stocks will accumulate and must be exhausted or disposed of as excess unless the item is small enough to justify consolidation at a key depot by interdepot shipment.

- (3) *Keying by commodity classification.* The keying of items by commodity classes offers a partial solution to the problem of changes in frequency of issue and should make it possible for the technical service to fix the responsibility for many categories of material with some permanence. To be effective this method should be com-

bined with keying by frequency of issue and should be flexibly applied. *For example*, one or more frequently issued items in a commodity class whose stockage is restricted may be excepted from the general rule, particularly when some of the criteria mentioned above for wide distribution can be applied, such as bulk and urgency of demand. The majority of commodity classes, in fact, will be subject to exceptions of this kind. This point will be discussed further at the end of this chapter and in chapter 7.

The commodity classification systems in present use by the services have generally not been adaptable to keying by commodity classes and the services have had to resort to keying by end use of the items: *for example*, topographic equipment, mortuary equipment, and marine equipment. However, these end use categories may cut across a number of commodity classes used by the service and may include items not peculiar to the end use specified. The Federal Supply Classification of commodities now coming into general use will be much more adaptable to keying by commodity class.

2. Storage Capacity of Distribution System

a. Introduction. Implicit in the preceding discussion is the fact that even the vast storage facilities of the Army are severely limited in relation to the quantity of goods to be stored. In many cases, for instance, the physical concentration of certain items or commodities in one depot or a group of depots could not be carried out because of the limitations of storage space, and the goods had to be fitted into whatever space was available. The analysis of total storage capacity, therefore, and the selection and location of stocks to fill this capacity and at the same time to meet the needs of the Army's mission, make up another of the basic problems in the overall management of the supply system.

There is no parallel in the commercial world to the problem faced by the Army in terms of volume and duration of storage required for

military supplies. All businesses must have working inventories and may acquire larger stocks temporarily to take advantages of favorable prices. But the flow of raw materials to the manufacturer and of finished goods to the wholesaler, the retailer, and finally to the consumer is geared closely to the customer demand. Any change in this demand is quickly reflected through the channels of distribution, and accumulation of inventory excesses and the consequent tieup of capital are avoided. On the other hand the Army must also not only supply its present customer, the Army in being, but must be prepared to furnish vast quantities of equipment and supplies to an army that may leap into being overnight. There will be no time to reflect a larger customer demand through distribution and production channels; the supplies and equipment must be available when the emergency occurs. The period during which the customers must be sustained before production and distribution can be expanded to meet the new demand, or the economics of acquisition of supplies, is covered in chapter 4 of this manual on requirements planning. In chapter 7, on disposal of excess supplies, some of the economics of holding quantities of supplies sufficient to meet all foreseeable needs are discussed. The economics of long-range storage and preservation have a direct bearing both on what should be disposed of and on what should be acquired.

b. Costs of Long-Range Storage.

- (1) *Need for cost information.* The Army cannot store all the quantities of all the items which it may need. Even if the standards of strategic necessity are rigorously applied, they still permit the acquisition and storage of supplies in quantities that strain the capacities of the present distribution system. In order to make informed decisions on what supplies to acquire and dispose of, the managers of the supply system must know the relative costs of storing the items or commodities under consideration.
- (2) *Capital investment.* Capital investment is of no less concern to the United States than it is to a private business, though it is not capable of such precise measurements due to the fiscal policy

of the Federal Government. Private enterprise considers interest paid on borrowed capital as a cost of running the business. Thus, if it could be shown that the Government must borrow in order to make the investment in inventory, it might be argued by analogy that the interest paid on the borrowed capital should be considered as a part of the cost to hold. By the same reasoning, however, if fiscal policy dictates that borrowing is not necessary, interest charges should not be included in computing holding costs.

- (3) *Other costs.* To this base of the invested capital in the acquisition cost of the item must be added a large number of additional capital and operating costs. Examples of such costs are:
 - (a) The investment in fixed assets, such as warehouses, sheds, buildings, improved storage areas, and trackage;
 - (b) The costs of labor and other personnel at the depots, inventory control points, procurement offices, and technical service headquarters;
 - (c) The investment in operating assets such as forklift trucks, cranes, locomotives, dip tanks, spray guns, sand-blasting machines, and other operating equipment;
 - (d) The cost of operating supplies such as preservation and packaging materials and office supplies;
 - (e) The cost of repairs and utilities.

As data on inventory value become available through the financial inventory accounting program, the direct and indirect costs of storage can be applied against the value of the inventory to give an accurate picture of the costs of storing given quantities of an item or commodity for given periods of time.

- (4) *Uses of storage cost information.* Information on storage costs cannot of course be used as a sole criterion for selection of inventories. In many cases strategic considerations will be paramount: it may be necessary to store critical and complex items until the storage costs far exceed the cost of

acquisition if the items must be on hand immediately in an emergency. Storage cost data should focus attention on items or categories of supply in which storage costs are high in relation to inventory value, and in combination with other considerations, should help to determine whether these high costs are justified. Decisions can then be made to reduce, maintain, or increase current stockage, reserve stockage, or retention levels so as to achieve the most effective balance between the usefulness of stocks on hand and the cost of keeping them.

Since complete data on storage costs, as outlined above, will represent a major portion of total costs of operating the the supply system, further analysis of these data for various purposes is necessary in all phases of supply management and will be discussed at appropriate points throughout this part of the manual. *For example*, the refinement of storage cost information by types of depots should assist in determining assignment of key and distribution missions on the most economical basis. The "cost of holding" is an important part of the calculation of economical order quantities as discussed later in this chapter. Storage costs as an element in the overall cost of maintenance are analyzed in chapter 7, on maintenance and repair parts. Chapter 9, on controls, again takes up this topic as one means of measuring the efficiency of supply operations.

c. *Economy of Storage Costs.*

- (1) *Introduction.* So far we have discussed storage costs as though they were more or less fixed "overhead charges" to be applied against the inventory on hand. The supply manager must also take the opposite view, regarding storage costs themselves as subjects for analysis and whenever possible for reduction. Less money spent in storing and caring for supplies means more money for supplies themselves and for the Army's manpower. Again this is

a topic that must run throughout any discussion of supply management; here one subject is selected that bears particularly on the storage of materiel: the costs of fixed assets.

- (2) *Costs of fixed assets.* The Army's supplies are stored in warehouses, sheds, and in open storage areas. Almost all supplies will deteriorate most rapidly in the last type of storage and least rapidly in the first. Since all items cannot be stored under cover the Army has published lists showing which items *may* be stored outside in open storage. SB 38-8-1 lists items designated for storage in sheds and in the open to the extent that such storage facilities are available at installations and such items have been preserved, packaged, and packed to withstand that type of storage. In practice, certain items *must* be stored outside, since factors such as the floorload of extremely heavy equipment, the inability to use vertical space by storing one piece of heavy equipment on top of another, and the inaccessibility of heavy material to handling equipment make inside storage impractical. However, these lists of items which *may* be stored outside also contain many items which can be stored inside with considerably less deterioration. *For example*, cotton mattresses should never be stored outside, but a small generator set can be stored outside although the rate of deterioration and cost of preservation is higher for outside storage. To obtain the most economical use of fixed assets, therefore, managers of all levels of the supply system must also know the costs of inside and outside storage for given items or categories of supply. These will include the cost and depreciation of warehouses, sheds, and handling equipment to be measured against the costs of packing and preservation in outside storage. The latter costs especially will vary considerably for different items. Some of the questions for determination are:

- (a) Is the construction of a warehouse more economical?
- (b) Is commercial storage space available at a rate and for a period that will cost less than preservation of the equipment to be stored outside?
- (c) Is the cost of transportation, to a place where covered space is available, less than the cost of preservation for outside storage at the place where the material is? The demand for the material where it is now in relation to the anticipated demands at the place to which it may be moved must be considered, including the cost of backhauling if pertinent.
- (d) What are the relative costs of depreciation and preservation in sheds as opposed to warehouses? Does the relative cost of preservation and depreciation between the shed and warehouse justify the cost of a warehouse?

The questions of whether to build another shed or warehouse where property is or to abandon storage facilities at one location and ship the material to another are problems of almost daily occurrence. Comparative costs must be known regardless of strategic considerations because there will be instances in which strategic considerations are equal or inapplicable and costs alone of alternative actions are pertinent.

- (3) *Costs of care and preservation in storage.* As indicated above the costs of preserving materiel in storage are intimately related to the costs of the facilities in which the supplies are stored. Preservation costs themselves should also be subjected to analysis in order to determine the most economical type and degree of preservation for the item in question. The length of time for which the item must be preserved and the cost of the item in relation to the cost of preservation should be analyzed just as overall storage costs and length of time in storage are examined

against the value of inventory. Another important factor in preservation costs is the location where the item will be stored and used. The costs of preserving equipment to withstand extreme cold, salt air, or tropical mildew are far greater than the expense to protect the same equipment for domestic consumption. If an item is intended largely for oversea use, *for example*, the costs of preservation and packaging will necessarily be high and this in turn should influence the methods of storing the item before it is shipped. Warehouse space should not be taken up with materiel packaged to withstand extremes of temperature and humidity at the expense of materiel not so protected.

3. Flow of Requisitions Through Supply System

a. Introduction. The location and amount of goods stored in the Army supply system and the physical pattern of distribution are determined by considerations of effective supply and economy of time, transportation and storage costs. Both are related, however, to the much larger management problem with which the rest of this chapter is concerned, the effective *control* of the movement of supplies through the distribution system. Basic to this problem of control is the flow of requisitions expressing customer demand through the supply system and the action taken as a result. Where does the requisition go, who acts upon it, and how is this action reported? As an introduction to the problems of distribution control, this section will discuss the forms and classes of requisitions.

b. Classes of Requisitions. The station supply offices and the Oversea Supply Agencies representing the variety of customers whom they support submit different kinds of requisitions for different kinds of items or for the same item to be used for different purposes. These various classes of requisitions in many cases require different processing by the depots and inventory control points. The classes of supply and the requisitioning procedure for each are shown below:

- (1) *Class I — Subsistence.* Subsistence items are ordered on a special pre-printed requisition form on which the

requisitioner shows the consumption of food for a stated number of days past and the requirements for a stated period in the future. Perishable produce is ordered from the nearest market center and nonperishable items from the appropriate distribution depot. Some bulk subsistence items such as flour, sugar, and salt may be shipped directly to stations from wholesalers based on requirements furnished to the depots. Oversea requisitions for subsistence are similarly submitted to the Oversea Supply Agencies at the Army Terminals by oversea commands.

- (2) *Class II—Troop issue.* Class II items are approved tables of organization and equipment or tables of allowance items together with repair parts to maintain them. At stations where supplies are actually consumed, nonexpendable supplies and expendable supplies must be submitted on separate issue slips. No such breakdown is required by the depots but the depots do require separate requisitions for:

- (a) Regulated items;
- (b) Repair parts;
- (c) Excesses over authorized allowances;
- (d) Special requirements for unauthorized items.

- (3) *Class III—Petroleum, oil, and lubricants.* In the continental United States open end contracts are awarded to oil companies for the supply of fuels such as gasoline and diesel oil. Lubricants, greases, and lubricating oils are ordered from the depots unless authorized for local procurement at the station. A few special use lubricants fall into the local procurement category. Oversea installations are supplied by the Army, Air Force, or Navy in designated areas through quarterly estimates supplied by the Area Petroleum Office serving the area to the Military Petroleum Supply Agency, which procures and arranges for shipment of the bulk fuels to the oversea commands. Lubricants, greases, and lubricating oils for oversea use are ordered through

the Oversea Supply Agencies from depot supplies.

- (4) *Class IV—Theater of operations construction materials and special projects.* Oversea commands draw up plans for various construction projects such as docks, airfields, barracks, and fortifications and submit plans together with estimated bills of materials through the technical services to the Deputy Chief of Staff for Logistics. When the plans and bills of materials as submitted or as modified are approved, the approved bills of materials may be used as the basis for the submission of requisitions to the Oversea Supply Agencies. In addition, the maintenance of existing facilities such as utilities and buildings is included in class IV supply. This is a continuing problem and results in a steady demand upon the supply system for a wide range of both standard and nonstandard items. Class IV supplies, particularly for the Corps of Engineers and the Signal Corps (fixed communication facilities), pose a large number of problems without easy solutions.

Within the United States most new construction is handled through the Corps of Engineers district organization which contracts for such work. Repairs and utilities supplies are obtained through local procurement or through the depot system. Special projects may receive special treatment.

- (5) *Class V—Ammunition.* The Ordnance Corps exercises logistic responsibility for ammunition; this responsibility includes stock control, storage, and issue. Requisitions for ammunition are submitted to Ordnance depots and supply points.

c. Exceptional Items. There are a number of items consumed or used by the Army that do not pass through the regular supply channels. For example, construction materials such as cement, sand, or gravel. Coal is purchased centrally by the Navy with the Corps of Engineers responsible for coordinating requirements within the Department of the Army. Bulk shipment of coal to oversea installations is arranged by the Chief of Engineers. Tactical maps are consid-

ered "intelligence material" and are supplied by shipment from the Army Map Service to the Engineer officer for the command. Repair parts for office machinery are not stocked but procured locally. As noted in connection with stations, the great majority of repairs and utilities items are procured locally. However, the depots stock and issue a few of the more expensive items such as pumps and fire fighting apparatus. Many of the bulk supplies for the fixed installations such as maintenance shops, laundries, and dry cleaning plants are procured locally. Various kinds of bulk paper stock used in printing are procured from local vendors. Many bulky items such as tanks, vehicles, large pipe, compressed gases, and many other similar items are shipped directly to stations or oversea installations directly from manufacturers. Lumber for class IV construction projects is procured and shipped directly to consumers without passing through the depot system. These are, of course, merely representative examples of the many items that are used or consumed by the Army but are not processed by the depot, nor, in many cases, by the inventory control point.

d. The Requisition. Virtually all classes II and V supplies, most class IV supplies, and a certain proportion of classes I and III supplies are requested in the form of requisitions upon the depot system. The simple procedures at the stations, where the troop unit submits an issue slip through channels to the station technical service accountable property officer, unfortunately cannot be applied when the depot must ship the supplies to a requisitioner many miles away and in many cases across the seas. The requisition normally must contain the following basic information:

- (1) *Basis or authority for supplies.* This is generally a brief statement transferred from the issue slip, such as "Authorized by TOE 5-53 and not previously drawn" or "To replace the identical item which has been turned in due to fair wear and tear." The basis may be a rather long statement in justification of the issue of more than is allowed by the tables of organization and equipment. It can be, of course, any reason why supplies are required.
- (2) *Required Date.* This is the date

the supplies are needed. Except for emergency requisitions, it is 30 days or more after the requisition is placed for supplies within the continental limits. The order and shipping time for oversea theaters varies by theater and by categories of supply demand; thus the required date for oversea requisitions varies too.

- (3) *Priority.* Requisitions may indicate the priority that should be accorded to the requisition, or the priority of the unit to receive its supplies ahead of other units.
- (4) *Special marking instructions.* Requisitions must specify the markings that should be shown on the packages to facilitate rapid delivery to the ultimate delivery point.
- (5) *Item identification.* This consists of the line item number of the stock ordered on the requisition, the stock number, the nomenclature or description of the item, and unit of issue, such as pound, drum, each, gallon, etc.
- (6) *Quantity required and stock status.* The requisitioner shows his approved level, the quantity already on hand, the quantity due in from previous requisitions, the quantity, if any, due out to his customers, and the quantity required to bring his stock back up to his authorized level.

e. Processing Requisitions Through Supply System. In addition to the various methods noted above of handling requisitions for different classes of supply, the processing of requisitions through the supply system, including the original destination of the requisition and its subsequent handling, is subject to much variation, according to the individual procedures of the technical services and the supply status of the item.

f. Management Problems in Requisitioning Process.

- (1) *Introduction.* One of the simplest transactions is the requisition upon an accountable storage point, either a distribution depot or a key depot, for supplies which the storage point is authorized to issue and which it has in stock.

Here the paper work consists of a requisition prepared by the requisitioner and a shipping document prepared by the depot, either as an original document or by converting the incoming requisition to a shipping document by reproduction processes. When the accountable storage point cannot approve the requisition for issue, either additional processing of the same paper occurs or new documents must be created increasing in number and complexity as more stages are added to the requisitioning process. Some examples of the increased paper flow when the accountable storage point is not the initial source of supply are tabulated below.

- (2) *Document flow for regulated items.* If the requisitioner sends his requisition for regulated items directly to the inventory control point, the inventory control point retypes the items on to a "shipping order" on a depot and the receiving depot retypes the items on to a shipping document. If the technical service headquarters is designated as the initial source of supply, this requisition is edited and stamped "approved" before it is forwarded to the inventory control point to be typed on to a shipping order. If the requisitioner sends his requisition to the distribution depot, the distribution depot retypes the items on to an "extract requisition" and sends it to the inventory control point. The inventory control point retypes the item on to a shipping order and sends it to the depot which retypes the items on to a shipping document.
- (3) *Document flow for keyed items.* If the item that is keyed is also regulated, the above procedure applies except that the inventory control point always sends the shipping order to the appropriate key depot. When the item is keyed only and the requisitioner does not place his requisition upon the key depot, he may send his requisition either to the distribution depot or to the inventory control point. In the latter case the inventory control point

retypes the keyed items on to a shipping order on the key depot. Where requisitions for keyed items are sent to the distribution depot, the distribution depot may either type an extract requisition on the inventory control point, which types a shipping order on the key depot, or it may send a teletype to the inventory control point asking for a source of supply. The inventory control point replies by teletype naming a depot to which the item is to be sent. The distribution depot then types the items on to an extract requisition which it sends to the depot named, the secondary source of supply, and the secondary depot types the items on to a shipping document.

- (4) *Special classes of requisitions.* Certain classes of requisitions without regard to commodity, such as requisitions for class IV supplies, MDAP requisitions, and requisitions originating with reserve components are specially processed in different ways by the technical services. When they are centrally processed, the procedures described above for regulated items are usually followed.
- (5) *Conclusion.* The preceding illustrations show the multiplication of work and the extension of supply time which result as the requisitioning process moves away from the simplest possible transaction involving a requisition and a shipping document. Much can be done, and is being done, to reduce both work and time through the introduction of improved techniques of recording and reproducing supply documents. The primary aim of supply management in this area, however, is to reconcile the need for simplicity in requisitioning procedures with the equally urgent need for selective and adequate control of the supplies moving through the system. The two subjects are discussed together in the remainder of this chapter, which takes up the management of the supply process, first at the depot, then at the inventory control points.

C. SUPPLY MANAGEMENT AT DEPOT

1. Introduction

The job of the depot is to receive, store, and issue supplies against authorized demand. As we have seen, however, control of these operations is not always exercised within the depot itself. The receipt of supplies at the depot, for instance, is usually determined by the inventory control point. The management of depot stock receipts, therefore, apart from record keeping and physical handling, is primarily an inventory control point function and will be discussed under that heading. The *minimum* task of depot supply management, comprising those supply functions which are peculiar to the depot and for which the depot usually has full responsibility, may be stated as follows:

a. To process action documents, maintain records, and compile reports of stock on hand and stock movements or delays and to obligate expected receipts against current demand.

b. To ship supplies against demand to meet required dates.

c. To protect and preserve supplies while they are stored at the depot. The management of these functions will be discussed in this section.

In the complex organization of the distribution system the *maximum* tasks of depot supply management extend far beyond these limits. On certain items the depot may have authority for local purchase and for others it can call for stocks from the manufacturer under centrally placed open end or call contracts to meet the demands of its customers. In these situations the management of stocks at the depot includes in varying degrees the functions of inventory control. Many depots have a maintenance responsibility. In subsequent sections and chapters of this manual, therefore, these additional functions of depot supply management will be discussed and an attempt will be made progressively to define the place of the depot in the overall picture of an effective and economical supply system.

2. Management of Action Documents at Depot

a. *Preparation of Shipping Documents for Available Items.* When CONUS requisitions are

received at the depot for items which it is authorized to issue, an "edit" or check of the authorization is made. If the item requested is not authorized the requisitioner under the authorizing document cited, the requisition may be returned with an appropriate notification, or clarification may be requested from the originator. In the case of oversea requisitions, this authorization edit has been accomplished by the Oversea Supply Agency prior to preparation of the extract requisition, and is not duplicated by the depot. The accountability records are then checked to determine whether or not the requested items are available in stock. This process is termed "editing for availability." Those items that are available are retranscribed to an invoice called the Army Shipping Document. This retranscription of the data shown on the requisition to a shipping document form is required because the shipping document contains essential information not on the requisition, such as the name of the common carrier, the bill of lading number, the weight and cubage of the shipment, the number of packages, etc. Also certain information contained on the requisition, such as the basis or authority for ordering the supplies, need not be shown on the shipping document. In most services these shipping documents are prepared by punching cards and listing the cards by tabulating machines onto a reproducible master for reproduction of the necessary number of copies. Several of the services are now preparing these shipping documents by placing those elements of the requisition that are common to the shipping document in a panel, adding to the common elements the new data required by the shipment, and in effect, photographing the panel for reproduction of the necessary copies of the shipping documents. Such methods of simplifying the basic transaction in the supply system deserve careful study by supply managers at the depot and active extension to their fullest possible usefulness. The economy of time and labor which they can effect is multiplied as they are applied to more complex transactions. Innovations in reproduction techniques presently being developed by the Army and by industry may be expected to introduce further improvements.

b. Secondary Actions by Depot.

(1) *Committing dues in.* When the items are not available at the depot and are a proper demand from the requisitioner, the depot may take certain secondary actions. First, it may place the items due out if stock is due in within sufficient time to meet the required date on the requisition. The requisitioner in such cases is advised generally by a notation on one copy of the original requisition that certain items have been ordered. If the stock is not due in within the required time, the depot normally must extract the unavailable item to the inventory control point. The amount, source, and delivery schedule of supplies due in, therefore, are important data for action by the depot on requisitions as well as for planning the best use of storage space, labor, and materials handling equipment. Aside from local procurement by the depot, stocks may be received from:

- (a) Central procurement.
- (b) Repair facilities.
- (c) Interdepot shipment.
- (d) Station returns.
- (e) Oversea returns.

The largest volume of stock is received from central procurement, with interdepot shipments and local procurement generally running second and third, respectively. In all instances, the principal problem is the time of delivery. Except in the case of ammunition, depots are advised of stocks due in from central procurement by copies of the purchase orders which specify the delivery dates, generally as 100 by 1 June 1958, 200 by 1 July 1958, and so forth. The ammunition national inventory control and maintenance point furnishes depots with expected receipts of ammunition. The depots pick up the quantities by expected dates of arrival, but often these contracts call for delivery many months in advance of the current date and are subject to all of the vicissitudes of delays in ma-

terial, labor difficulties, and rescheduling by the inventory control point. Since a depot seldom has a required date on a requisition further than 60 days away, stock due in more than 60 days in the future has little bearing on the editing action. These facts suggest the desirability of distinguishing between current dues in and long-range dues in, and of furnishing to the stock editor only specific information on stocks due in within the next 60 days. The stock editor does need information on the source of the expected stock because such information may have a bearing on his editing action in filling requisitions. *For example*, stock due in from station and oversea returns may not be in issuable condition when it is received and rebuilt stock may be suitable only for issue within the continental limits. The problems of dues in from interdepot transfers are discussed later in this chapter in connection with the inventory control point, because control of stocks in transit is a national problem rather than a depot problem.

(2) *Extracts and shortage reports.* Where items will not be available in sufficient time to meet the required date and cannot be procured by the depot, the depot refers the items to the inventory control point by one of the two following methods:

- (a) *Extracts.* The nonavailable items are transmitted to the inventory control point. Under this procedure, the original depot "washes its hands" of further responsibility for the supply of the nonavailable items and passes the responsibility to the inventory control point.
- (b) *Shortage reports.* Some services use what is known as the "shortage report procedure." Under this method the depot transmits a teletype to the inventory control point listing the items that are not available. The inventory control point checks the national availability rec-

ords for another depot which may have the stock. If stock is available nationally, the original depot is teletyped what is called an "advice of availability" which informs it where to send the extract requisition. In this instance the originating depot types the same extract requisition described above and transmits it by mail to the secondary source named.

- (3) *The effect of automatic data processing equipment.* The use of automatic data processing equipment as a tool of inventory control is having important effects upon the supply procedures of the depots. There is a general trend toward using expensive electronic machines to process the masses of paperwork involved. This trend is working toward centralized accountability and control within large segments of the depot system. The use of electronic tools may change the mechanics by which control is accomplished, but it does not change the fundamental factors of the problems involved. All technical services are rearranging their supply organizations to take advantage of the usefulness of the rapidly developing electronic tools.

3. Transportation Management at Depot

a. Introduction. The need for a nation-wide analysis of transportation costs in determining depot service areas has already been discussed. On a smaller scale the depot must also plan for the most economical movement of supplies from its warehouses to its customers. Recognition of the complexity of the subject has caused the establishment of a Transportation Division under the technical supervision of the Chief of Transportation in each depot. Although the supply manager at the depot cannot be expected to become familiar with all the rules, regulations, and details, he must have sufficient familiarity with transportation to plan the movement of goods intelligently and economically.

b. General Procedures.

- (1) *Shipping analysis.* A better under-

standing of the problems of transportation planning can be gained by a brief outline of the procedures generally followed at the depots. Detailed procedures are not altogether uniform at all depots and for all kinds of commodities but the general routines described below are typical. After the availability of stock has been ascertained, the proposed shipment is examined, line item by line item, to determine:

- (a) The weight and cubage of each line item. When a number of small items fall within parcel post limitations, but does not amount to a truck or carload, the shipment is marked for parcel post or for LCL (less-than-carload lot).
 - (b) How many "subnumbers" or separate voucher numbers will be required. Wheeled or track vehicles, dangerous chemicals or explosives, high precision instruments which are subject to expensive damages and items of special value are examples of the types of commodities which must be separately documented.
 - (c) How many railroad cars or trucks by type are required. *For example*, it must be determined whether the shipment will be carried in a boxcar, on a flatcar, in a refrigerated car, etc.
 - (d) The rate of loading. When, *for example*, a large shipment of construction equipment is to be made, perhaps only five carloads a day can be inspected, serviced and loaded.
- (2) *Carload and truckload movements.* After the proposed shipment has been analyzed and the number of cars or trucks by type determined, the Storage Division advises the Transportation Division, generally by copies of the shipping document, in order that the trucks or cars may be spotted at the point of loading. The Transportation Division of the depot requests advice from the Transportation Corps Zone

Office of the Chief of Transportation as to the mode of transportation and the routing. If the shipment is going to an Army Terminal, the Transportation Division requests advice from the appropriate zone office as to the mode of transportation and routing. These movements have to be scheduled by the zones in coordination with the Army Terminals involved to meet ship schedules and avoid "piling up" as well as arranging divisions where necessary, especially when such diversions may effect monetary savings in transportation costs and yet not affect delivery date at destination.

- (3) *Less-than-carload or truckload lots.* If the shipment can be made by parcel post, the Storage Division of the depot packages, marks, and mails the goods without reference to the Transportation Division. If the shipment amounts to more than the limits of parcel post, but less than a truck or carload, the Storage Division picks, packs, and marks the goods before advising the Transportation Division. When the goods are ready for shipment, the Transportation Division is advised. Generally the Transportation Division picks up the goods from the Storage Division and takes them to a consolidating point where they may be combined with other small shipments to the same destination. During all these processes careful attention is given to the "required date" on the requisition, which indicates the date when the supplies are needed by the requisitioner.
- (4) *Reusable cargo transporters.* One method of improving the shipment of military cargo is use of the CONEX transporter. This transporter is essentially a steel box with side opening door, having outer dimensions of 8' 6" in length, 6' 3" in width and 6' 10" in height. The transporter has interior space of 295 cubic feet, is rated at a 9,000-pound capacity, and is equipped with hoisting pads and skids. Designed to facilitate oversea shipment of mate-

riel, the cargo transporter affords the following advantages:

- (a) Protection to materiel in transit so as to enable reduced preserving and packing.
- (b) Physical consolidation of small shipments for a single destination.
- (c) Expeditionous handling and loading of materiel, as a unit, by materials handling equipment.
- (d) Greater security of pilferable materiel. Current Army policy promotes utilization of CONEX for shipments to oversea destinations. CONEX transporters are ordered by depots from the Transportation Corps, which service is logistically responsible for the transporters and controls their allocation by serial number in the same manner that freight cars are controlled. When a depot shipment for a single oversea destination is not sufficient for utilization of a cargo transporter, the materiel may be processed and documented for CONEX shipment and transported to the Army Terminal to be consolidated with other materiel for the same destination and transporter loading.

c. Management of Transportation Planning.

- (1) *Required dates.* It has been noted previously that without the permission of the depot the required date on the requisition cannot in the absence of an emergency be less than 30 days from the date of the requisition for domestic shipments. Generally the required date for oversea shipments is about 60 days from the date the Oversea Supply Agency submits the extract requisition to the depot. In some cases the required date has already passed when the depot processes the requisition because of delays incident to extracting, re-extracting, and procurement actions. In most instances, however, when the depot has the stock and authority to issue it, the depot can pick, pack and ship the supplies long in advance of the required date. The cur-

rent practice is to process requisitions through Stock Control, Storage and Transportation Divisions, within priority, in the order of receipt. Scheduling is made sufficiently flexible to provide for expediting requisitions delayed in transmittal, or for items requiring care and preservation. Requisitions are not held up in the depot to enable arrival of supplies to coincide with the requisition required date, unless the early arrival of the shipment would, by reason of volume, create a storage problem at the station. If a shorter order and shipping time should make it possible to reduce station requisitioning objectives in the continental United States alone from the levels currently in use, the inventory reductions and consequent savings would be substantial. Such a reduction would not necessarily decrease the effectiveness of supply from the depot; under the present 30-day regulations most of the items on which some secondary action has to be taken cannot in any case be shipped to the customer by the required date. While the depot managers themselves will not have the responsibility for determining station stock levels in terms of days of supply, such decisions cannot be made without estimates and determinations by the depots of a realistic minimum shipping time.

- (2) *Consolidation of shipments.* The economies possible through reducing depot order and shipping time allowances must be balanced against the freight savings possible through holding small shipments for consolidation. The depot Stock Control and Storage Divisions may contend that there is no need for them to expedite their processing times if the Transportation Division is going to hold the shipment several days until it can be consolidated. The Transportation Division points out that the transportation cost of shipping 15,000 pounds at less-than-carload lot rates is about the same as shipping 40,000 pounds at whole carload

rates and that holding shipments for consolidation can often cut transportation costs in half. There is no cut and dried answer to this problem. The Transportation Division must know from experience the approximate tonnage by period to each destination and the likelihood that additional shipments will be consigned to the same destination. Since five to six days are required to process a requisition, the Transportation Division might be kept informed of the destinations shown on the requisitions as they enter the processing line. It would then be possible to ascertain about a week or longer in advance whether or not any further shipments to a particular destination can be expected. Another approach that might be considered is the scheduling of requisitions to take advantage of economical transportation units. Stock levels are now based exclusively upon the number of days of supply that the requisitioner may maintain. The high costs of transportation suggest that there may be instances in which the interval of replenishment should be predicated upon the size of the shipment that would result rather than the number of days of supply authorized for stockage. When the same station requisitions from several technical service sections at the same general depot, the requisitioning schedules should be coordinated to permit maximum interservice consolidation as authorized by current Department of the Army regulations.

4. Storage Management at Depot

a. Introduction. The economical use of the overall storage capacity of the Army's supply system has already been discussed and many of the problems handled fall within the scope of the storage manager of the depot. Where the prescribed type of storage space is not sufficient, he must determine which supplies should be afforded greater or lesser storage protection than that prescribed. Ultimately all economies in storage costs depend upon the efficiency of storage at the individual depot. This section

concentrates upon further aspects of storage management: the location of stock, physical inventories and the rotation of stocks.

b. Location of Stocks.

(1) *Physical location.* The ideal location of stock is seldom obtainable. This means the location of fast-moving small items near the packing room, location of heavy or bulky items near handling facilities such as cranes and rail tracks, and location of the same item always at the same place. The nature of military requirements involves so many variables that the storage division of a depot is not likely to be in a position to anticipate receipts and issues far enough ahead so that all items can be located advantageously. Nevertheless the storage manager should know as far ahead as possible the shipments due into the depot by time period, any contemplated bulk shipments out of the depot by time period and the rates of issue of various commodities. He should also be supplied with up-to-date information on changes in any of these rates or schedules. Knowledge of shipments due in or out permits him to schedule personnel, handling equipment and space. Knowledge of the rate of issue of various commodities permits him to consolidate stocks of the same item at the same location to the maximum extent possible provided he can allocate enough space to hold the quantity of the stock he expects to store. Where he is severely hampered by lack of adequate space, consolidation of the same item at the same location may have the offsetting disadvantage of wasting inside space for stock due in while stock already on hand must be stored outside. This situation is the rule rather than the exception and has forced all of the services to establish multiple locations for the same item. When stock is received, the location records are examined to see if some of the same item is already stored. The location is checked to determine whether

the new stock can be added in the same space. If all or part of the new stock can be consolidated with the old stock, such consolidations are generally effected. If the new stock is too large to consolidate at the old location and the old stock is down to a few items, it may be expedient to set up a new location and move the stock already on hand over to the newly established location where there is sufficient space to store the consolidated stock.

(2) *Location of related components in storage.* One of the responsibilities of the depot, noted above, is the assembly of sets, kits and outfits. In addition, a large number of stock items not classified as sets have many resemblances to sets because of components, accessories and supplies issued with the item. *For example*, a camera may be issued with a carrying case, extra lens, a tripod, and so forth. Normally a small camera such as used in the illustration would pose no substantial storage problem because it is likely that all the accessories would be packaged with the camera. But in the case of a large power shovel that comes equipped with a boom, a boom extension, a bucket, a set of fairleads, tagline, tools, publications and first echelon parts, the problem is of some consequence. The basic power unit, the boom and the bucket are stored outside. The fairleads and tagline are stored inside in one place and the tools and first echelon parts are stored elsewhere inside. The Storage Division of the depot must collect all of these accessories and components when the complete shovel is issued. The same problem occurs in the issue of a combat tank with the radio apparatus, tools and parts. The Storage Division must establish various types of subsidiary records which show quantities and locations of the various accessories, components and parts that are required for an end item.

(3) *Stock location records.* Although practices vary somewhat among the serv-

ices, the routine described below is generally representative of most procedures. Location records are generally maintained in stock number sequence and within stock number by condition of stock. These records usually show the size of commercial package but do not show the quantity at the location. The storekeeper writes out a form for "locations established" or "locations exhausted" when incoming shipments must be located or outgoing shipments exhaust a location. These forms prepared by the storekeeper are sometimes posted to a card by entering a new line or crossing through a line representing an abandoned location. In other cases the form prepared by the storekeeper is simply filed in stock number sequence and pulled out when an "exhaust" notice is received. These records are generally maintained in the administrative office of the warehouse and are searched from the work copy of the shipping document, the clerk noting on the work copy of the document one or more locations where each item may be found. If the stock picker cannot find enough stock at the annotated locations on the work copy, he telephones the location clerk for any other locations that may be recorded for the item. Because these location records are the only source generally of information as to the number of items contained in the packages received from the manufacturer and because commercial packs vary for many common items, the stock picker must either "break up" a package for odd quantities, or ship in even packages by altering the quantity shown on the shipping document and advising the stock clerks to change the records. The administrative cost of processing the change to the records by an inventory adjustment report is so great that it is generally considered cheaper by the services to break up the manufacturer's original package and repackage the odd quantity than to ship in origi-

nal packages. Some of the services have remedied this situation by merging location records with stock availability records so that the quantity to be shipped may be altered to fit the packages before posting the entry to the stock record account. Other services, to the extent practicable, indicate on the stock record card the type and quantity of commercial pack.

c. Physical Inventory Procedures. Physical inventories of stocks to verify paper stock record accounts are performed annually and are usually scheduled to spread the inventory workload over the year. Routines vary between the services but most of the essential features are the same. The general practice is to copy the location records and send out an inventory team. If the team count agrees with the records, no further action is taken. If the counts do not agree, a recount is taken. All stacks are flagged to show that they have been counted and at the end of the counting a tour is made to see whether some stack is unflagged, showing that the stack did not have a location record. This annual inventory is scheduled so that only a limited number of classes of supply within a depot at a time are closed down during the period of the inventory. If the count agrees with the records, no further verification is made. If not, a recount plus a search of "exhausted" locations is made. All services send out a physical inventory team to check any item that reaches a "zerobalance" on the stock record accounts to determine if the stock is also "zero" in the warehouse. All warehouse refusals, or cases in which the records show a balance but the warehouse reports that no stock can be found, are also verified by physical inventory. Whether the physical inventory is annual, cyclic or special, the records are finally adjusted by an "Inventory Adjustment Report" or a "Report of Survey." The latter is only used in certain instances such as unusually large discrepancies in value or quantities, and requires action of a surveying officer.

d. Rotation of Stocks. The rotation of stocks is important for virtually all commodity areas and absolutely essential for certain items. Items such as canned food, rubber products, drugs and chemicals that deteriorate rapidly in storage

must be rotated to avoid losses of stock. Barring complete and expensive preservation for extreme long-range storage, all items should be rotated by issuing the oldest stock first. If newly received stock has not been processed for long-range storage and stock already on hand has been, it may be expedient to issue the new stock first, depending upon the cost of preservation measured against the rapidity of deterioration notwithstanding preservation. Complete preservation can seldom be achieved within economic bounds and machinery, *for example*, will continue to deteriorate to some extent notwithstanding "complete" preservation. Accomplishment of proper stock rotation may present some difficult problems. If a depot is turning over all of its items rather frequently, the location clerk can select the "oldest" location or the stock picker can select the "oldest" stock. But the oldest location may include new stock because the stock picker added the last receipt to the established location, or the stock picker pulled from the front of the stack where stock was just

added rather than from the back of the stack where the old stock is located. The rotation of some items such as subsistence is so important that the records carry the "date of pack," but the administrative burden of establishing separate records for each receipt of the same item would be prohibitive if applied to all commodities. At the depot much can be done by discipline and inspection to insure movement of the older stock. Where the depot stock status reports to the stock control point do not show the age of stock, as most reports do not, the stock control point cannot relate its calls on the depots to stock antiquity. It would be prohibitively expensive to apply the date of pack to all items in stock status reporting but considering the volume of calls on the depot from the inventory control point which now has no knowledge of the age of stock, an extension of the date of pack for subsistence items to other items of a relatively short storage life and a low or variable frequency of issue appears both practicable and desirable.

D. SUPPLY MANAGEMENT AT INVENTORY CONTROL POINT

1. Functions of Inventory Control

The functions of inventory control make up the central and critical area of supply management. National planning of the overall distribution pattern and facilities is an essential first step and the efficient movement of supplies through the depots is an essential sequel. But the effectiveness of the supply system as a whole is measured by its success in balancing supply, the assets and inputs of the system, against the multitude of demands upon it. This is the task of inventory control.

2. Tools for Control of Stocks

a. Introduction. A large part of the day-to-day activity of the inventory control point consists of handling immediate demands for supplies, either placed directly by requisitions or referred from depots which do not have the stock available. In order to accomplish these daily tasks, as well as to effect long-range control of stocks, the inventory control point must receive from depots information bearing on stock status. The most important of these tools of stock control are described below.

b. Reports of Depot Stock Status. Since the depots are widely scattered and can issue supplies to meet local demands without prior recording by the inventory control point, or can receive stock from various sources without knowledge of the inventory control point, or can establish dues out against anticipated receipts, the inventory control point must receive frequent reports of stock status at the depots to obtain a picture of national stock availability. Also the stock issued by the depot and the purpose for which it was issued must be known to assist in forecasting future needs. The reports of depot stock status provide this central consolidation of stock status to the inventory control point at prescribed intervals.

Both the frequency and coverage of these stock status reports vary considerably among the services. One service has every depot report every balance on every item every day. Another service has the depots report daily on "significant changes" in the quantities on hand, due in or due out using a 10% change as the yardstick for determining significance. Other services vary the reporting frequency by selec-

tion of some items for weekly reporting, some items for monthly reporting, and other items for quarterly reporting, generally basing the selection on frequency of issue and on whether the items are in long or short supply.

Information on the stock status report generally includes by condition and account stock on hand, due in, due out and issued for the calendar year to date. The stock levels or requisitioning objectives of the depot are also generally included. In some cases the depots are required to compute and include the quantity "short or over" by this formula: On Hand plus Dues In minus Dues Out minus Stock Level equals Quantity Over or Short. This over or short figure is used as a quick means of selecting those items that may require replenishment at a depot, or as a means of determining excesses at a depot. In other cases the stock accounting is centralized in the inventory control point, and the depots report only changes in stock balance.

c. Detailed Analysis Reports of Depot Issues. The depot stock status reports are supplemented by detailed analyses of stocks issued, due in and due out at the depots. These issue reports, which are compiled for periods varying from six months to eighteen months, eliminate the distortions which would follow from the analysis of a single month's issues. A consolidated issue analysis report is prepared at the inventory control point to show by stock number the initial issues and replacement issues for the Regular Army, National Guard, reserve components, oversea installations, etc. Issues are generally consolidated for all depots and for the entire period under review.

d. Detailed Analysis Reports of Depot Receipts. Reports are also submitted analyzing depot receipts. These are broken down by source, as from central procurement, local procurement, depot transfer, returns from stations or returns from overseas.

e. Repair and Rebuild Schedules. The quantities of reparable stock at the various depots are included in the depot stock status reports. Schedules showing current and anticipated progress in repairing or rebuilding this stock are also made available to the inventory control point.

f. Procurement Status Reports. The inven-

tory control point receives reports from procurement activities showing quantities of stock being centrally procured, together with estimated dates of receipt.

g. Reports of Stocks With Troops, in Station Inventories and Oversea Depots. The Machine Records Units of the Adjutant General's Corps, although basically organized for the reporting of personnel, also compile reports of several thousand selected items of supply in the hands of troops in the continental United States and overseas, in ZI station inventories. Items are reported quarterly. These reports have been recently revised to include quantities of equipment by make and model to assist the inventory control points in computing repair parts requirements. A few of the technical services receive periodic complete reports of all stocks in oversea depots and other services receive reports from time to time of selected items.

h. Reports of Troop Basis and Movements. The inventory control point, has information on the present location and composition of troops together with any contemplated changes in troop composition, location or equipment.

i. Liaison Visits. Regular and special liaison visits to depots, stations, Army Terminals and oversea areas add personal observations and reports to the information collected by the inventory control point.

3. Control Actions to Meet Immediate Demand

a. Daily Activity at the Inventory Control Point. A considerable part of the inventory control point's daily activity is concerned with determining secondary sources of supply for those requests referred to it by the depots; those requisitions received directly from the field by the inventory control point without passing through the depots and those shipments initiated by the inventory control point not based on a requisition. Approximately 50% of all line items shipped by all depots have been processed through the inventory control point, either initially or as a secondary action, in the course of one of these activities.

b. Extract Requisitions. When extract requisitions or shortage reports are received from the depots, the inventory control point determines from its records of stock status reports

from all depots whether stock is available at another depot. If the stock is available, the inventory control point prepares shipping orders or sends notices of availability to the depot or depots in accordance with the procedures outlined above under depot supply management.

c. Regulated Items. Requisitions for regulated items received directly from overseas agencies and stations are similarly checked for national availability and shipping orders are prepared on the depot with stock nearest the requisitioner.

d. Miscellaneous Requisitions. Other requisitions received by the inventory control point, such as requisitions for class IV projects, large overseas demands, Government-furnished property, etc., are likewise disposed of by the preparation of shipping orders on the various depots.

e. Automatic Shipments. The inventory control point computes the requirements and initiates shipping orders on the depots for various purposes without a formal requisition from the consignee. Examples of this type of action are:

- (1) *Initial activation of troop units during time of war.* Here the inventory control point calculates from the tables of organization and equipment or tables of allowances the quantity of stock required to equip initially or bring the organization up to authorized equipment and initiates the shipping orders on the depots.
- (2) *Equipping POM units during time of war.* The inventory control point receives a list of shortages of items for units being prepared for overseas movement and forwards necessary shipping orders on the depots to equip the units before departure from the CONUS. During peacetime essentially the same procedure is followed in bringing troops up to authorized equipment strength for purposes of engaging in maneuvers.
- (3) *Establishment of new overseas bases.* The determination of requirements for new overseas bases is made and shipping orders placed on the depots by the inventory control point.
- (4) *Initial repair parts allowances.* The inventory control point computes from

various allowance tables the required repair parts to support end items that have been or are being supplied to consignees and initiates shipping orders on the depots to supply the parts.

f. Account Transfers and Borrowing. Equities of stock are maintained either at the depots or at the inventory control point in separate accounts for various requisitioning services such as the Air Force, Navy, MAP, etc. When equities of stock at a particular depot near the requisitioner are not available, the inventory control point often ships the supplies from that depot out of other accounts and balances the national equity of the owning service by adjusting entries at other depots. Also stock is "borrowed" from reserve accounts in many cases to meet urgent demands and later replaced. Ammunition is an exception to this general rule since equities are maintained only at the inventory control point.

g. Set Assembly. The inventory control point maintains certain numbers of preassembled sets, kits and outfits at the depots. Where these sets are composed of separately stocked items, the inventory control point instructs depots to segregate items for set assembly into a separate account and by shipping orders consolidates the items into a particular depot charged with the physical assembly of sets, kits and outfits.

h. Repair and Rebuild. The inventory control point must keep informed of the repairing and rebuilding of economically reparable stock to meet current and future demands. This activity must be closely coordinated with maintenance facilities, and the technical service headquarters. The inventory control point is informed of the return of stock to an issuable condition by the repair and rebuild schedules mentioned above.

4. Management of Stock Control Activities

a. Extracting and Re-Extraction.

- (1) *The problem.* The problem of extracting was pointed out in connection with depot supply management. Under procedures which provided for control of stocks to be split between depots and inventory control points extracting and which allowed a considerable time lag between stock movement and stock re-

porting, extracting became the largest single problem in the day-to-day control of stocks.

- (2) *Acceleration of document and report processing.* Rapid communication between depots and inventory control points is now practicable through the use of electronic tools such as the transceiver. Transactions can be reported daily, and electronic data processing machines give the inventory control points the capability of processing automatically huge amounts of data so that overnight a stock status report can be produced which reflects all the transactions of the day before across the entire system.

- (3) *Refinement of the national stock availability picture.*

- (a) *Experience and judgment factors.*

Over a period of time the inventory control point builds up a considerable fund of experience relating to the movement of stocks generally through the system and at individual depots. On the basis of this experience, certain limited predictions can be made of the rate at which a depot is likely to exhaust its stocks. Furthermore, knowledge of anticipated troop movements and other plans enables the inventory control point to plan for unusual demands before they are reflected in the national availability records or other reports which it receives. Use of this experience and knowledge can help considerably in maintaining national and local stocks in a balanced condition. The latitude of judgment allowed to personnel at the inventory control point should not be unreasonably restricted by rigid directive nor by rigid interpretation of general directives. *For example*, one service regulation stated that to save transportation costs shipping orders from the inventory control point should be placed on the depot nearest the requisitioning activity. A stock availability desk was handling an extract

requisition from a West Coast depot for eleven units of a certain hand tool. A 45-day-old availability tape showed a Mountain State depot with fifteen hand tools and a Middle West depot with 628 hand tools. While the clerk's experience indicated that the Mountain State depot would almost certainly have issued enough stock since the date of the availability tape to bring its quantity on hand below the necessary eleven, she was compelled under the regulation to place the shipping order upon this depot. The Mountain State depot supplied six hand tools and re-extracted five. This issue exhausted its stock so that in addition to the re-extraction of five hand tools, it was certain that the next requisition upon this depot would result in further extraction. Eliminating situations of this kind through careful consideration of all activity affected by a regulation could reduce the traffic in extraction considerably.

- (b) *Control and records of stocks in transit.*

1. *Recording assets in transit.* Dues in consist of two types of assets: potential assets and assets in being. The long-range due in representing goods to be manufactured in the future or being manufactured now is a different type of asset from those goods already in being, but in transit between manufacturer and depot or between depots. Goods delivered FOB manufacturer's plant and stock being transferred between depots, as well as returns from stations and overseas, are examples of such assets in being which give rise to the problem of intransit control. Accurate records of stocks in transit will correspondingly increase the accuracy and timeliness of the total picture of national stock availability.

2. *In transit stock as a type of dues in.* Depot X has been directed to ship stock to Depot Y. From the point of

view of Depot X, the stock has ceased to be an asset at the time the order was processed to the warehouse. Depot Y cannot consider the stock as asset on hand until it has been received physically. Depot X cannot hold the stock on its books until Depot Y receives it nor can Depot Y pick it up before actual receipt from Depot X without distorting the availability records the quantity being transferred as an ordinary dues in, actual assets of the technical service are not distinguished from potential assets which are still on the assembly line or in the raw material stock rooms of the manufacturer. But from the point of view of the inventory control point, stock in transit is an asset of the technical service in being regardless of the technicalities of accountability.

Since station and oversea stocks are not usually merged with continental United States depot stocks at the inventory control point, dues in from station and oversea returns cannot be treated similarly and must be handled as special kinds of dues in that reveal the in transit nature of the transaction by the indicated source of the due in. Dues in from procurement where there has already been acceptance at the manufacturer's plant may be reflected as a special type of firm due in from a copy of the inspection report. In summary it may be said that the requirements for due in data at both the depot and the inventory control point should lead to a greater refinement of records than that presently in use.

- (4) *Conclusion.* In the areas described above improvements are being made in the performance and economy of the operating supply system which will reduce the traffic in extraction. Some of the techniques suggested have broader applications and will be considered also in relation to other functions of

supply management. It must be noted, however, that no one improvement nor any combination of improvements can be expected to produce perfect supply performance, reduce all transactions to the simplest formula of a requisition and a shipping document and do away with extraction. Aside from inevitable errors and misjudgments, none of the methods discussed has attacked the fundamental problem of day-to-day stock control: the separation of the accountable storage and issue point from the control of stock. So long as both depot and inventory control point can direct stock issues—and this is true of the vast majority of items in the supply system—duplication of work and records, delayed reports and the cycle of extraction must follow. The approach to this basic problem must lead also to an overall analysis of the location and the nature of operating control over Army stocks. This will be examined at the end of this chapter.

b. *Account and Condition Reservation Codes.*

- (1) *Introduction.* Many of the customers of the Army, such as the Air Force and foreign nations included in the Mutual Defense Assistance Pact, operate under appropriations which are separate from those allotted to the active Army. When the Army buys or sets aside supplies with these funds, it carries these stocks in separate "account codes" which may be defined as stated quantitative equities in the total quantity on hand in the Army supply system, segregated on separate stock record accounts. A depot, for instance, with a total stock on hand of 200 of an item may show 150 in the Regular Army account and 50 in the Air Force account. The same breakdown is reflected in the national stock availability records at the inventory control point.

Condition codes are normally used to indicate the physical condition of stocks: new, used but serviceable, unserviceable but economically repairable, and not economically repairable. However,

in practice the condition code has been broadened in scope to represent a refinement of the accounting classification of stock, known as a "condition reservation code." *For example*, Regular Army stocks segregated on the records for the assembly of sets are identified in the Regular Army account code 11, condition code 4, whereas Regular Army stock in new condition but unreserved would be identified in account code 11, condition code 1. Thus in effect the condition code is sometimes used as a subclassification of the basic accounting classification. The purposes of the accounting and condition classification code include:

1. Segregation (usually as a "bookkeeping entry" rather than physical separation) of specific quantities of specific items by ownership: Regular Army, Air Force, MAP, reserve components, etc.
2. Segregation of stocks held for mobilization and strategic reserve. Again, normally, the segregation is not physical separation of stocks in the warehouse, but merely on the books.
3. Segregation of stocks within accounts by physical condition. Here the segregation is usually both on the books and in the warehouse.
4. Segregation of stocks for some specific purpose, often by the use of the condition reservation code method described above.

The preponderant use of condition reservation codes is in connection with set assembly. Sometimes the items to be assembled in sets will be identified under one condition reservation code pending assembly, and transferred to the second reservation code during actual assembly. Equipment set aside for repair, equipment set aside pending inspection for serviceability, equipment set aside because it is incomplete for one reason or another are examples of the many types of segregation made on stock records by the account and condition codes. The practical

necessity for many of what might be termed "interim segregations" of quantities of stock to reflect a transitory situation is caused by the fact that each stock balance is reflected by condition and account on a separate punched card and only another punched card can change the records. Any memorandum entry that might be made to indicate, *for example*, that 250 of the total quantity of 1,000 available are being held for set assembly would be lost when a new card showing activity on the unobligated 750 is mechanically substituted for the previous balance card. Thus any temporary obligation, reservation, or question about some portion of the total quantity of stock on hand must be reflected immediately by a former transfer of that quantity into a suspense or hold account to prevent the issue of the stock until the question can be resolved.

Account and condition reservation codes are another major source of administrative and clerical work in the supply system. Various studies have indicated that at least one quarter of all stock transactions in the system are paper transfers between account and condition codes. As in the case of extraction, the workload pyramids at the inventory control point. This section, therefore, will take up the problem of account codes; the following section will discuss condition reservation codes with particular reference to set assembly.

- (2) *Transfers between account codes.* In the case of stock held under different ownerships only the national total of the stock for a particular ownership account may accurately represent the equity of the owner. If the equities are maintained at the depots and the owner calls for the stock at the depot nearest to him, he may find that depot without sufficient stock to meet his demands. Where this situation occurs it becomes necessary for the inventory control point to transfer between accounts at

two or more depots. *For example*, the Air Force may have a total equity of 250 pairs of binoculars in all depots of a service. It then places a requisition for five pairs on Benicia Arsenal in California where there is no Air Force equity. Let us assume further that there is stock on hand at Benicia in the Regular Army account, whereas the Letterkenny Depot in Pennsylvania has ample stock in the Air Force account and no balance in the Regular Army account. The following adjustments to the accounts must be effected by the inventory control point:

	BENICIA		LETTERKENNY	
	Account	On hand	Account	On hand
Before:	11 (RA)	5	11 (RA)	0
	21 (AF)	0	21 (AF)	5
Adjustments:	11 (RA)	-5	11 (RA)	+5
	21 (AF)	+5	21 (AF)	-5
After:	11 (RA)	0	11 (RA)	5
	21 (AF)	5	21 (AF)	0

Thus any imbalance between depots in stock held under an ownership account results in a number of accounting transactions, the simplest of which is illustrated above. If the quantity of stock being issued to the Air Force in California were large, offsetting transactions at several depots might be required.

- (3) *Consolidating ownership accounts.* The type of item just used in the above illustration, binoculars, explains the origin of the ownership accounts for the Air Force, reserve components and the other services and suggests a principle that might be used to re-examine the practice. When funds were provided for the purchase of critical, long lead time items such as binoculars, the service providing the funds insisted upon delivery in kind and the ownership equities were established to insure that binoculars, rather than an equal value in a less critical item were furnished. However, the practice of segregating ownerships by account codes gradually was extended to cover secondary items such as pencils and toilet soap. Perhaps a reexamination of the use of ownership codes for specific quantities of

items under the following principles might lead to a reduction in the number of accounting transactions now required to maintain such accounts:

- (a) Under financial inventory accounting, dollar credits could be established for categories of material instead of specific quantities of specific items. The owner of the dollar credit could draw all unexpected items until his credit was exhausted.
- (b) Critical items such as the binoculars in the illustration might be regulated centrally (which is already done in most cases) against specific quantitative equities without any breakdown at depot level by ownership accounts.

c. *Set Assembly.*

- (1) *Definitions of sets.* The impact of set, kit and outfit assembly upon the supply system in terms of account codes, accounting transactions, interdepot shipments, backorders and extraction is hard to overestimate. Basically the intention of set assembly is to pull together within the supply system related items or components that are to be issued as a unit. There are thousands of such related items stocked by the Army and hundreds of different sets, kits and outfits are assembled from them. In order to attack the problems of set assembly, therefore, it is necessary first to examine the typical composition of various sets, kits and outfits and to assess the impact of each type upon the supply system. It is extraordinarily difficult even to apply a common term to all collections of related items. They may range from a hermetically sealed first aid kit bought as a single unit and never broken into separate components to a complete field hospital with tents, X-ray machines, beds, etc.; from a set of small hand files in a canvas roll to a complete rock crushing, screening and washing plant that requires seventeen flatcars to move. In one case the Army may buy the whole kit, set or outfit already as-

sembled from a single manufacturer, *for example*, a set of Allen head set-screw wrenches; in another it may buy the components from several dozen manufacturers, *for example*, an Engineer topographic set for making maps. In some cases every item in the set is peculiar to the set, *for example*, a soil testing set. In other cases a wide variety of the items will be common to other sets; *for example*, an identical screwdriver can be a component of a mechanic's tool set, an electrician's tool set, a carpenter's tool set, and so forth. In some cases the whole kit may be replaced and not the parts, as the first aid kit. In other cases components may be replaced as a broken hammer in a carpenter's tool set. In many cases the Army does not term an end item a set but in practice issues it as such, *for example*, a powered shovel consisting of a basic unit, a boom, a bucket, cable, etc. Just as we might purchase a household mixing machine and receive several bowls, a juicing attachment, mixing blades, and so forth, so are military items issued with accessories and attachments. In some cases an initial supply of consumables may be issued just as razors are sometimes furnished with extra blades and shaving cream. It is often difficult to distinguish such accessories or attachments or components from repair parts. Since repair parts are generally handled by a separate element of the technical service and are not distributed in the same way as sets or end items with accessories, the distinction is often important because of its effect on issue responsibility.

- (2) *Sets and tables of organization and equipment.* Often the technical services in designating certain collections of related items as sets have had an additional purpose beyond insuring that the user would receive an entire group of items designed as a unit for the accomplishment of a specific mission. The designation of sets has also

appeared desirable in order to maintain the stability and usefulness of tables of organization and equipment. By listing on the table a "Carpenter's Tool Set" or a "Mechanic's Tool Set" or a "Diving Outfit, deep water" it is possible for the technical service to alter the composition of a set to meet changing requirements without republishing the many tables of organization and equipment on which it appears. The technical services publish the composition of sets in separate pamphlets in section 6 of the catalog series to troop units. They then make interim changes by the use of lists and cards furnished to the depots which enables them to translate a requisition for a set of equipment into the latest composition. Thus the maximum flexibility is obtained to meet changing requirements in set composition without continuous alteration to the tables of organization and equipment.

(3) *Problems of set assembly.*

- (a) *General.* Among the enormous variety of item collections those which cause more difficulty to the supply system and to the inventory control point in particular are the sets whose components are separately procured, stock numbered and issued. The small sets, kits and outfits procured, stocked and issued as an unbroken unit cause relatively little difficulty except for replacement of the components. When replacement of a component is feasible, separate identification and stockage of the replacement components can be correlated with the number of complete sets, kits, and outfits in use. The supply catalog from which the requisitioner orders these small sets, kits, and outfits should include identification of the components either as spares or end items and should indicate the source of replenishment.

- (b) *Segregation of stock record accounts.* When the components of a set are separately procured, separately stock

numbered and assembled into sets in varying quantities, it becomes necessary to segregate the balances for set assembly on the stock records to prevent issue for another purpose before the sets can be assembled. Since in many instances the components of a particular set are separately issued as end items, are components of other sets or are likely to be issued as replacements for sets already in the hands of users, the inventory control point must direct the depots to set up the balances held for set assembly in separate stock record accounts to prevent dissipation of the assets for other purposes.

But establishing separate stock record accounts for the items held for set assembly may lead to other complications: a more pressing demand for the item as a replacement to a set already issued may require "robbing" of the account and later restitution. Since the inventory control point is not certain exactly how many sets can be assembled until the depots have confirmed what quantities have been set aside, it may be found that issues of the required components were made before the advice to set aside was received. The timelag between actual stock status and availability reports is again an important factor here. When this situation occurs, which is the rule rather than the exception, either the number of sets to be assembled must be reduced and the excesses of plentiful items returned to issuable accounts, or the short quantities placed on due out. When the items are placed on due out, every receipt of a missing item or quantity must be correlated against the other items on backorder to determine whether this particular receipt will permit assembly of the sets.

(c) *Operability of incomplete sets.* When not all the items in the set are available, the question arises whether the

set would be operable with the available items. The question is sometimes as simple as whether a typist's outfit would be operable without a typewriter. In other cases, however, the decision is a difficult one and requires considerable technical knowledge of the use to which the set will be put. If it is decided to issue the available components, the depot normally establishes dues out for the missing components and supplies them when they become available.

(d) *Technical service cognizance.* Sets are often composed of items supplied by more than one technical service. For example, an Engineer bridge may contain a Signal Corps flashlight or a Army Medical Service hospital may contain an Engineer generator set. In practice the assembling service will obtain the other services' equipment and include it in the initial issue of the set but will require the user to requisition replacements from the other services.

(e) *Replacement of components.* The practice of preassembling sets on orders from the inventory control point gives priority to initial issues of complete sets over replacement issues of components. During the period that stocks are "frozen" to determine availability, the depots cannot issue individual components and supply performance suffers by the generation of extracts. This problem is extended by the common practice of designating many sets as regulated items. Even when the inventory control point has not designated the set as regulated, individual requisitions for complete sets from users may be extracted to the inventory control point and compel it to freeze stocks in order to meet demand.

(f) *Interdepot transfers.* Although in theory components are bought specifically for set assembly and shipped to the assembling depot, shifting re-

quirements after initiation of procurement results in considerable traffic in interdepot shipments of components being transferred to a central depot for assembly.

(g) *Excessive supply to users.* Since many items such as common hand tools are included in a wide variety of sets, using units often receive excessive supplies of such common components by receiving several different sets with the same component.

(h) *Changes in set requirements and composition.* Often quantities of items are set aside in separate stock record accounts to build X number of Set. No. 1, but a more urgent demand occurs for a related Set No. 2 before Set No. 1 can be assembled. Since many of the components may be common between the two sets, but in different quantities, it therefore becomes necessary to set aside additional quantities or to transfer out excess quantities of particular items. Changes in the composition of sets after assembly sometimes occur and it becomes necessary to unpack and substitute another item, or to substitute a different quantity of the same item, or to add other items, or to remove certain items.

(4) *Management of set assembly and issue.*

(a) *Advantages and disadvantages of preassembly.* Listing sets on tables of organization and equipment rather than listing the individual components enables the technical service to modify the composition of the set without the great expense of republishing the many tables of organization and equipment on which the set appears. Depots are provided with current set compositions and are able to assemble a set requisitioned as such in accordance with the latest approved composition. Thus, the fact that the set is listed by name only on the tables of organization and equipment does not require the depot to preassemble the

components prior to the receipt of a requisition. Preassembly of sets, kits, and outfits has both advantages and disadvantages, a tabulation of which may assist in an analysis of the problem:

1. Advantages of preassembly:

- a. A requisition for the entire set can be honored without the delays incident to selecting and packing the individual components.
- b. Sets can be preassembled by mass production techniques during periods of reduced activity.
- c. The question of operability is eliminated because all of the components are available.
- d. The number of stock items in inventory may be reduced by the number of set components that are not normally stocked for replacement.
- e. Emergency demands for strategic purposes or for mobilization can be met quickly without the delays incident to possible component shortages and the selection and packing of the available components.
- f. There is an element of convenience to the ultimate user in receiving all components at the same time.

2. Disadvantages of preassembly:

- a. Stocks needed to maintain sets already in existence may be tied up in preassembled sets, a practice which in effect gives preference to the new user rather than to the user who needs a replacement component.
- b. Components common to several sets may be tied up in preassembled sets for which there is no pressing need, while there is need for the same components to assemble other sets. This may result in delays in the supply of available components while all of the components are being assembled. *For example*, the ultimate user may be in urgent present need of many of

the tools in a particular tool set and would prefer some tools now even though not all of the tools in the set are available at the depot.

- c. There is of necessity a large amount of traffic in the supply system caused by shipping components between depots for preassembly. These assets in transit not only are expensive in transportation costs, but they are assets lost to use while in transit.
 - d. Modification of the composition of sets after preassembly results either in the issue of the less satisfactory composition, or in the expensive job of unpacking, changing the composition and repacking.
- (b) *Controlling preassembly of sets.* The preassembly of sets within the supply system should be critically reviewed by stock managers at the inventory control points and by technical service headquarters. It is difficult to generalize about the large variety of item collections carried by the Army, and the above list of advantages and disadvantages may be expanded or modified in particular cases. It may often appear, however, that the several serious disadvantages and costs of preassembly outweigh all advantages except possibly those of having a sufficient number of preassembled sets on hand to meet strategic and mobilization requirements and the economy in fewer republications of tables of organization and equipment. But it should be noted that except for the slightly longer time required to select and pack set components an emergency demand can be met from adequate stocks of individual components; thus preassembly even for this purpose suggests the more immediate need of insuring that all set components are available. Preassembly at the depot increases stock accounting transactions because of the interim transfers or balances between accounts

and condition reservation codes that must be made during the course of preassembly. These considerations suggest the basic question: Is the physical preassembly of sets the only means of insuring that sufficient quantities of set components are available to meet demands? Firm obligation of sufficient quantities of individual items to preassemble the number of required sets for strategic and mobilization reserves might accomplish the same purpose without the many disadvantages listed above. The use of sets as a device to avoid frequent republication of equipment tables will be discussed later. From the standpoint of the ultimate user, who is in any event responsible or accountable for the individual components, the convenience of receiving a preassembled set varies considerably with the nature of the set and the mission of the unit. Once the ultimate user receives the set of equipment, the only difference between having a set and not having a set is in the catalog which he uses for replenishment; if he has a set, he uses section 6; if he has separately issued items, he uses section 3. At the time of initial issue, it is often true that the only difference between receiving a set and receiving separately issued items is the fact that the depot issuing the set may have placed the components inside the special chest or box designed to hold them. In such cases as these the basic problems incident to set assembly will lie within the supply system rather than with the user, and the seriousness of these problems as hindrances to efficient supply will often indicate the desirability of eliminating the preassembly of sets and issuing the components as separate items.

- (c) *Controlling assemblages.* The adage to the effect that you may get too much of a good thing is particularly

appropriate to the control of sets, kits, and outfits. We have seen that such assemblages can be convenient, useful, and a simple way of handling related items which are required to accomplish a specific mission or purpose. But the practice could ultimately be projected to the point at which the tables of organization and equipment would contain seven lines: Ordnance Equipment, Infantry Company, Quartermaster Equipment, Infantry Company, and so on. Manifestly the grouping of tools into sets and kits for the automobile mechanic, electrician, and the carpenter is a convenience to the user and to the supply system. On the other hand, grouping a wide assortment of items such as clothing, guns, and cooking gear into a single set would combine material that has little in common as to use, physical characteristics, source of procurement, consumption rate, storage requirements, and responsibility for distribution. Because literally every item in the supply system has some relation to other items in the hands of the same user, any item in the supply system might be combined with one or more other items to form a kit, set, or outfit. It has been noted too, that the issue of accessories, attachments, carrying cases, repair parts, etc., with major items is little different in final effect from the issue of what is formally termed a set. In an area so broad, it is impossible to establish principles that might govern the universe of commodities issued to every element of the Army. Virtually any rule is subject to some exception when tested against particular assemblages or particular demands. The following principles that may be observed in testing the validity of assemblages of items are therefore generalizations:

1. The purpose or end use to be made of the set should be as narrowly

limited as possible in order that all users may employ all of the items in the set. However, a single tool set, *for example*, for every kind of electrical repair is not feasible because the lineman, the radio repairer, and the motor rebuilder require different tools and no one user is likely to perform all three functions.

2. The practice of compiling "super sets" that embrace hundreds or thousands of items, including sets within sets, may be questioned in several respects. These sets seldom exist as such in the supply system and the single line identification on the tables of organization and equipment for such an assemblage destroys the purpose of the tables of organization and equipment, which is to provide to the user a list of the supplies and equipment to which he is entitled. It might be noted in this connection that as more and more assemblages are listed on tables of organization and equipment and the description of the material on the tables is further abbreviated, tables are increasingly becoming merely reference indexes to other publications instead of lists of authorized allowances. These super sets are often approaching, if not reaching, the situation where they embrace all of a technical service's equipment issued to a particular user.
3. The practice of combining both consumable supplies and nonexpendable items into sets might be questioned from several standpoints. Replacement demand calculations for the components of such sets are much more complicated. Quantities and varieties of the consumable supplies tend to be modified much more frequently than the nonexpendable items in the set. The same consumable supply item in the set may also be consumed for other purposes by the same user and its inclusion in the set is therefore duplicative and serves

no useful purpose. The list of consumable supplies is usually, at best, an estimate of the quantity of such supplies that should be carried in reserve, and this may be unrealistic when the set is placed in actual operation.

4. The practice of combining equipment and supplies issued by more than one technical service in the same set might be questioned on the basis that the confusion in supply responsibility caused may not be worth the convenience to the user.
5. The composition of sets will have to be carefully reviewed to avoid inclusion of components for which supply responsibility has been delegated to station level. Such delegation of responsibility is discussed in the last section of this chapter.
6. The practice of including common purpose hand tools with each major item issued should be carefully analyzed against the possibility that the recipient of the major item already has such tools.

5. Controlling Stock Levels

a. *The Army Field Stock Control System.* One part of the Army's plan for modernizing its supply procedures is a system of controlling stocks below depot level. Named the Army Field Stock Control System, it is composed of three basic elements:

- (1) A selective stockage plan;
- (2) Improved stock records; and
- (3) Gathering and reporting realistic consumption-demand data.

This new system came about when the Deputy Chief of Staff for Logistics in late 1954 directed that all technical services develop a common stock control system based on demand data reporting which was being tested by the Ordnance Corps under Project 170.

Previous systems allowed supporting elements including direct support companies, Army field depots, theater depots, and posts, camps and stations to requisition those items of supply

which they thought were needed. So-called "reasonable" levels of stock on many of the 700,000 odd minor secondary items and repair parts were maintained regardless of true requirement based on the major end items and units supported. An Ordnance maintenance unit in Korea carried cab-over-engine vehicle parts even though there were no vehicles of this type in the theater.

Conversely, the reporting of issues instead of demands confused the true requirements for supply. When a desired item was not available, substitutes were frequently issued. A six-inch screwdriver can often be substituted for an eight-inch screwdriver. Through the use of issue data alone, it is theoretically possible to increase procurement and subsequent distribution of six-inch screwdrivers to the point where no more eight-inch ones remain in the supply system.

Under the Army Field Stock Control System, no stockage is authorized below technical service depots unless supported by three demands in 180 days. Concurrent programs in standardization, cataloging, end item density reporting are providing better data for more realistic basic load requirements which in turn enable supporting supply echelons to provide the fast-moving items as needed and to call forward from key depots the slow-moving items when required.

Complete implementation of this plan was completed at all appropriate installations 31 December 1957. Department of the Army objectives under this plan include:

- (1) Reduction of the number of different items in the supply system.
- (2) Reduction of the quantity of items supplied.
- (3) Reduction of the quantity of items in stock.
- (4) Removal of seldom used items from lower echelon stockage.

- (5) Expediting of the movement of parts for deadlined equipment.
- (6) Integration and unification of technical service systems.

b. Forecasting Local Demand.

- (1) *Inventory functions.* The problems of national demand forecasting, which are covered in chapter 4 of this manual are multiplied locally in proportion to the number of depots in which any stock item is held. If only one depot is to stock the item, its stock level is the national stock level. But the majority of items are stocked by a number of depots, ranging from two or more than a dozen. It is a major task of inventory control to anticipate demand at each of these storage points, to establish operating and safety levels for them following the pattern of the national level and to schedule deliveries into each point to maintain the level and meet demand.
- (2) Local demand forecasts are based primarily upon issue experience of individual depots, which were obtained from the issue analysis report or corresponding data. Like the national stock analyst, the forecaster of local demands must make use of:
 - (a) Information on troop basis, composition and disposition, and scheduled changes in these programs. Knowledge of the location and composition of troops with supporting overhead services and installations can be applied against allowance tables to determine where supplies should be placed for distribution. When it is known that troop strengths will be changed at different locations, that alterations will be made in overhead services and facilities, or that changes will be made in the quantities or kinds of items authorized, the manager can plan and revise his quantities and levels.
 - (b) Seasonal demand. Seasonal demand may vary at different locations with climate and local programs.

- (c) Equipment population. Because the dispersal of equipment does not necessarily follow the dispersal of troops, reports of equipment in the field are broken down by areas to give a local demand. Since these reports are generally compiled by continental Army areas in the United States, they do not always correspond to the distribution areas of individual depots.

In addition, the manager must take into account certain factors that are peculiar to local demand. These include the total and the available storage capacity of individual depots, the bulk and shipping costs of the items stocked and the repair and rebuild schedules at individual depots which will add to or subtract from their issuable stocks.

- (3) *Problems in estimating local demand.* The fluctuations of day-to-day demand make it extremely difficult to plan levels in advance so that actual quantities of stock on hand at any individual depot will be sufficient to fill requisitions and shipping orders. Large demands from oversea requisitioners, demands for initial and special supplies and the movement of troops within the continental United States and to and from overseas may exhaust one depot's stock overnight and leave another with stocks far exceeding the needs of its reduced supply mission. No general rule for the establishment and review of stock levels will take care of every possible demand at every point in the system. The present figures on extracts, showing that one quarter or more of all line items requisitioned are not available at the depots on which requisitions are initially placed, indicate this conclusion clearly enough, and it is unlikely that this situation can ever be wholly remedied. In seeking improvements, the closest attention should be paid to flexible scheduling of receipts from pro-

curement and to the analysis of stock imbalances with a view to the most economical means of correction.

(4) *Scheduling receipts from procurement.*

In the planning of procurement schedules, the stock control manager is normally interested in the greatest possible frequency and flexibility of deliveries under any given order. *For example*, if the total national delivery is scheduled at 300 units once every three months, and five depots stock the item, the stock manager must then plan ahead three months for each of the five depots. If the same total delivery is scheduled at 100 units each month, the stock manager does not need to plan so far ahead and has greater flexibility in meeting fluctuations in demand without extraction or interdepot transfers. There are limiting factors, however, to the frequency with which deliveries can be scheduled:

- (a) The contractor's production methods and schedule, which may necessitate relatively large infrequent deliveries.
- (b) Transportation costs. The analysis of freight costs for carload and less-than-carload lots may indicate that it is extremely uneconomical, particularly for low bulk items, to make a number of small shipments.

In approaching the problem of scheduling, stock managers should carefully consider the analysis of key and distribution patterns which was noted earlier in this chapter. If items of low issue frequency are stocked in only one or two depots, the results of miscalculation of demand are less serious than if the same items are widely stocked in smaller quantities, where a slight quantitative increase in demand can wipe out stocks at any one of the scattered storage points. Proper assignment of key and distribution missions can do much to ease the difficult problems of local scheduling.

(5) *Balancing stock after receipt.* The

limitations on the flexibility of delivery scheduling make it almost impossible to insure that all local stocks will be in balance at all times. In the past when individual depots have had shortages or excesses beyond their established levels, it has been the usual practice in all technical services to redistribute stocks by "leveling actions" involving interdepot transfers of supplies to raise or lower stock quantities to established levels. Since this procedure involves additional paper work, transportation, packing and handling, an aggressive program directed by the Department of the Army has been aimed at reduction of these transactions. Interdepot transfers of material have been reduced from an average of 60,000 to 80,000 tons monthly to less than 20,000 tons monthly.

A certain minimum of interdepot transfer, however, will always remain, and the manager is still faced with the problem of maintaining local levels and correcting unbalanced stock positions. In the analysis of these situations, the following points need to be considered. In the case of excesses at the station level:

- (a) Is the item in short supply nationally? If so, it may be expedient to pull in the excess stock for redistribution regardless of other considerations.
- (b) Will the excess stock be absorbed in a reasonable time measured in terms of costs of transportation to remove it as opposed to costs of caring for it at the station?
- (c) Is the item in long supply at the depots and disposal at the station therefore appropriate?

In the case of excesses and shortages at different depots, the following additional considerations apply:

- (a) Will the cost of extracting against the excess at a depot, including the cost of smaller shipments to consignees farther away, be more or less

costly than making a bulk transfer of the excess to another depot? Of course, if all depots are in long supply, this question would not apply. If the item is in short supply in several depots, the quantity in overall excess in relation to the quantity in overall shortage must be considered against time and desirability of procuring to replenish depots in short supply.

- (b) What is the bulk of the item? If the item is small and frequently issued, transfers between depots may be economical, whereas if the item is bulky and infrequently issued, extracts against the excess at one or more storage locations may be more economical. Will the excess at one depot, either as a single item or several items, make up a whole transportation unit to another storage point in short supply?
- (c) Is the item of a deteriorating or seasonal nature, requiring rapid consumption of the excess in the first instance and permitting the stock to lie dormant in the second instance until the new season?
- (d) What future planned changes in missions or anticipated changes in troop strengths and locations or changes in allowances or other such considerations, will affect the demand at the depot in long or short supply?

6. Modern Army Supply System

The modern Army Supply System or MASS as it is called, is an example of how a major improvement to the supply system is being field-tested in Seventh Army for suitability for use throughout the supply system. It is a system designed to replace heavy pipeline stockage with rapid customer service. The latest means of communication, control, data processing, and transportation are used to produce that service.

In concept, the system is simple. At the organizational level, a small stock of fast moving parts plus some insurance items is maintained to accomplish the authorized level of mainte-

nance. This stock is carried with the unit and is therefore held to a minimum consistent with the nature of the organization's mission. No formal records are required at this level as far as stock accountability is concerned. This stock is replenished by the direct support organizations.

The direct support organizations carry stocks of parts for replenishment of the organization units' stocks and, in addition, stocks of parts required to support their own maintenance activities plus some insurance items. Generally, these parts are selected according to demand—any part demanded three times in 180 days is considered for stockage. A formal stock control record is kept at this level. It is needed to manage stocks, but it is not kept as an accountable property record. The repair parts supply personnel at this level are responsible for the accuracy of requisitions which go forward for supply action.

Absolute accuracy of all information is essential to the operation of the system. It is assumed that the responsible staff officer in charge is both honest and capable; therefore, the requisition he submits is considered valid for supply action. His requisition is submitted on punched cards by means of a transceiver, located at the nearest transceiver installation. Communications from this point on are electronic.

Rapidity of communication, the paring down of stockage, and the precise scheduling of routine transportation backed up by premium transportation are all characteristics of this modern Army Supply System. The system itself is evidence of how the Army Supply Manager works for improvement through imaginative application of new capabilities to his old problems.

7. Single Manager Concept

Essentially, the Single Manager Plan places the control of one commodity area under the secretary of a particular military department. For instance, the Secretary of Defense has designated the Secretary of the Army to be responsible for the organization and operation of the Single Manager Assignment for Commodity Groupings such as subsistence and clothing and textile materiel. In addition, petroleum, medical-dental materiel, and traffic management are under single manager systems.

The Single Manager Operating Agency is the heart of the Single Manager Plan. This is the focal point for control of the Single Manager operations, the place where the ownership of wholesale stock rests. The agency is managed by an executive director, appointed by the head of the technical service designated to supply a particular commodity to other departments and services.

An administrative committee assists the Executive Director in identifying and overcoming problems concerning the operation of this assignment. The committee is neither a policy board nor an executive directorate, but rather, is a group of specialists who recommend solutions to particular problems. The committee seeks to promote effectiveness and economy in the agency's effort to meet the needs of the military services.

The need to eliminate overlapping and duplication in the supplying of many common-use items provided one important reason for the creation and development of the Single Manager System. Instead of having each military department procure its own subsistence, *for example*, there now is a single procurement agent—the Army. Through its Quartermaster marketing center in Chicago, the Army buys all subsistence on demand from the Navy or Air Force. It performs the actual procurement, contract administration, and the contracting negotiations.

The application of the Single Manager System has provided several changes in supply operations. It has centralized the control of distribution and the control of inventories for their most economic utilization. It has eliminated much duplication of warehousing of identical items in adjacent depots (where two or more services are involved). The time and distance for serving retail consumption points from depots also has been reduced. The Single Manager System has assured coordination of procurement, procurement scheduling, and contract administrations. Finally, the System has centralized in one location the supply demand and control functions—such as net requirements computation, inventory management, and procurement direction.

The Single Manager Plan meets the recommendations of the Hoover Commission for Central Agency Control. It likewise meets the crit-

icisms of the Congress with respect to costly cross-hauling and duplication and overlapping of pipelines, storage facilities, and procurement.

The Single Manager Plan is concerned primarily with:

Medical-Dental Items.....	7,062
Petroleum Items.....	1,046
Clothing and Textile Items.....	34,295
Subsistence Items.....	1,861
Total	44,264

These categories:

1. Are largely common-use items.
2. Are completely cataloged.
3. Have had some coordinating attention.
4. Contain many of the duplicating-stock cross-haul troublemakers.
5. Are 2% of the total number of supply items, but are 20% of line item receipts and issues, involving expenditures of about \$2.6 billion per year.

The Single Manager directs (within his Assigned Commodity Area):

1. Worldwide inventories.
2. Research.
3. Procurement.
4. Stock Fund operations.
5. Screening Excesses.
6. Training.
7. Net Requirements and Computation.
8. Cataloging and Standardization.
9. Inspection and Quality Control.
10. Distribution and Redistribution.
11. Storage and Transportation.
12. Major Maintenance and Repair.

The Single Manager relies on the supply departments of the services for:

1. Program requirements.
2. Technical advice through advisory groups.
3. Operation of Area Distribution Depots.
4. Optimum utilization of existing departmental skills and facilities.

8. Interservice Supply Support

Interservice Supply Support is the name given to the policy of interservice use of available materiel within the Department of Defense. The policy aims to improve the positioning of supplies, balancing inventories, and reducing back-

hauling and cross-hauling of materiel within the military supply systems by making these supply systems mutually supporting.

Specifically, interservice supply support is the action taken by one military service or agency to provide supplies and related services to another military service or supply agency. In a Joint Army-Navy-Marine Corps-Air Force agreement the four services have:

- (1) Established an Interservice Supply Support Committee of Senior Supply

Managers to guide and maintain interservice supply support.

- (2) Established Commodity Coordination Groups including the appropriate inventory managers to deal with particular commodity groupings of supply.
- (3) Caused major commanders in both continental United States and overseas to establish task groups and committees to coordinate and accomplish interservice supply support.

E. COMMODITY CONTROL AND DELEGATION OF SUPPLY RESPONSIBILITY

1. Principles for Distribution Management

So far this chapter has concentrated upon the standard or typical process of supply in the Army system. It has applied to those stocks which are centrally procured, centrally controlled by inventory control points, and distributed through requisitions or shipping orders placed upon key or distribution depots. Until recently, this standard supply process covered, with minor variations, the vast majority of items stocked by the Army. Over the past few years, however, a number of methods and management concepts have been introduced or have been given new emphasis by the Army, and some of these, such as the use of open end and call contracts and the wide delegation of procurement authority, have already become significant factors in supply operations. The purpose of this concluding section of the storage, distribution, and stock control chapter is to examine some of these developments in the light of the underlying principles of supply management which they represent, and to apply these principles to the current problems of the Army supply system which have been discussed previously. There are two principles which may be derived from present developments and applied to future analysis of the Army supply system. These are:

- a. Undivided supply responsibility for commodity classes and categories of items;
- b. Delegation of supply responsibility to levels in the supply system which are appropriate for each item or group of items.

2. Undivided Supply Responsibility

a. *Combination of Functions.* The technical services have recognized that a purely functional

organization for supply is impractical. We have seen, *for example*, that the "requirements function" for minor secondary items, or the estimation of total future demand, is inseparable from the "distribution function," or the location of this demand by geographic areas and the scheduling and placement of receipts to meet it. Both in turn are intimately related to the procurement function in the areas of delivery scheduling, analysis of market conditions and economical order quantities.

b. *Commodity Centers.* The logical end of these developments is an organization which will bring together the related functions of supply, including requirements, distribution and appropriate aspects of procurement, under a single management. The question then arises: What principle of organizations will serve to replace the functional divisions and break down into manageable segments the overall responsibility for supply? The answer which is most consistent with the present responsibilities of the technical services and which is already being studied by the Department of the Army, is that unified supply responsibility should be assigned by commodity groupings. The technical services are broad commodity organizations. In some services one inventory control point handles all the items assigned to that service, in others there are two inventory control points, one for end items and one for repair parts, and in others a number of inventory control points have been set up for commodity groups within the supply responsibility of the technical service. The already existing commodity orientation of the technical services therefore provides the basis for the establishment of "commodity centers," each of which

would have complete supply responsibility for a more or less limited group of related items.

The concept of the commodity center implies more than changing the titles of the old stock and supply control points and combining their functions. The commodity center should handle a group of items which is small enough and has a sufficiently close relationship so that overall supply performance by the center can be measured by significant and practical standards. Within the center, also, the concept of commodity and item specialization should be the guiding principle of organization. While the ideal of one specialist for each item is economically impossible, the specialist concept implies the maximum stability of personnel in commodity or item assignments and the continuous accumulation of experience in supply and demand history to apply to the difficult problems of distribution management.

c. Unification of Accountability and Control.

(1) *Introduction.* The combination of supply functions, as so far discussed, has left out of account one function of supply which is important under any supply organization: the control of issues and the assignment of accountability for stocks. In the preceding discussion of the current supply organization, it has been noted that a distribution mission depot generally maintains accountable records for items stocked, and issues stock against requisitions, whereas the inventory control point can direct the depot to ship the same stock. To this dual control, established in order that the bulk of supply be accomplished by direct transaction between depot and requisitioner, has been ascribed many of the shortcomings of the supply system, including extracts, the necessity for testing stock status for set assembly, and the absence of a detailed picture of issue history at any one point in the supply system. As a result, there is some advocacy, under the commodity center concept, of the centralization of accountability and authority to issue stock, with central processing of all requisitions. In con-

sidering such a move, many factors must be evaluated.

(2) *Advantages.* The following arguments have been advanced in favor of centralized accountability and control of issues:

- (a) Reduction in recordkeeping and reporting, since depot accountable records and stock status reports would be replaced by the single set of accountable records maintained at the commodity center.
 - (b) Elimination of extracts and shortage reports, since all shipments would be controlled by the commodity center, based upon current stock information available at that center.
 - (c) Simplification in scheduling of receipts, since the importance of maintaining balanced stocks in all depots to prevent extractions would be eliminated.
 - (d) Reduction in interdepot transfers, since shipping orders could be placed so as to effect supply from the overstocked depot, and receipts from procurement routed to exhausted depots.
 - (e) Greater use of direct shipment from manufacturer to user, with resulting economies, since all requisitions would be received by the commodity center.
 - (f) Elimination of the necessity for testing stocks prior to the assembly of sets.
 - (g) Improvement in requirements computations, by virtue of the availability of current stock status information and issue data at the commodity center.
- (3) *Disadvantages.* Arguments advanced against central accountability and control of issues are:
- (a) All requisitions would, in fact, be extracted since none would be directed to the actual source of supply, and by this lengthening of the supply line workload will be increased, supply action slowed.

- (b) Stock denials by depots in response to shipping orders would not be completely eliminated, since stocks in storage are subject to change in serviceability, loss, pilferage, and variation from documented quantity.
 - (c) Withdrawal of accountable records from the depots would not eliminate stock recordkeeping, if the depot is to be responsible for warehousing, care and preservation activities, surveillance, classification, and disposal.
 - (d) A considerable portion of the depot reporting workload would continue in order that the commodity center be kept informed of changes in serviceability, classification, receipts, returns, and inventory adjustments.
 - (e) Centralized accountability would make reconciliation of inventories and resultant adjustments more difficult.
 - (f) In war, destruction of the commodity center, with centralized stock records and controls, would paralyze the supply system. The costly solution of maintaining duplicate files at an alternative site would still lack the flexibility in the event of disaster which is inherent in the currently decentralized system.
- (4) *Conclusion.* A commodity center plan which brings together the computation of requirements, the control of procurement and distribution of stock, and to some extent, the control and recording of issues, provides a potent means of obtaining supply management objectives. It gives the commodity manager a greater responsibility than previously existed in the supply system. His overall performance is constantly under review, and the demands on his judgment are heavy and continuous. But it also gives him the means of meeting this responsibility and the opportunity to develop a high level of experience and "know-how" in commodity behavior. The combination of great responsibilities and the tools with which to fulfill

them is an incentive to efficient and economical supply.

3. Delegation of Supply Responsibility

a. Introduction. The principle of unified supply responsibility must be viewed and applied in close connection with another fundamental principle of distribution management, the delegation of supply responsibility. Delegation has always been an important factor in Army supply operations; as noted earlier in this chapter, stations procure and stock their own bulk supplies such as sand, coal, and oil, together with repairs and utilities equipment and materials, and many other items. Responsibility for such items is delegated out of the supply system entirely. Recently, the trend to delegation has increased to a marked degree, with the use of open end and call contracts at several levels in the supply system and outside it, and a larger assignment of local procurement authority both to depots and to stations.

In the light of the commodity center concept, the importance of delegation is increased. Clearly it is impossible to centralize the complete supply responsibility, including issue control, for all items which are supplied to the Army's customers. Even the most efficient central control of common commercial items for which responsibility is presently delegated would involve wasteful storage, paperwork and administrative effort. Many other items which are at present controlled centrally by inventory control points may not prove adaptable to such control when commodity class data become available. The commodity center concept therefore demands the maximum delegation of supply responsibility for all items which can be more economically supplied at the local level. Next, it requires the delegation of complete operating responsibility for such items, including control. Management controls over delegated items may be retained at the commodity centers through financial property accounting reports and the analysis of turnover rates.

The question is therefore: What items are at present delegated to local levels of control, to what levels are they delegated, and what criteria or principles should be used to guide the further development of delegation? The basic purpose of delegation is to remove the delegated items

themselves together with the costs of storing, handling, issuing, and controlling them, wholly or partially from the supply system. If a certain hardware item is procured and stocked locally by distribution depots, the records, reports and workload related to central control of this item are eliminated; if the same item is further delegated to station stockage and procurement, the additional savings include the investment in inventory and processing costs at the depots. The principle limiting factor in delegation is procurement. Certain items made to military specifications and peculiar to the military must be procured centrally, from a single manufacturer or a group of manufacturers. At the other extreme, many items are identical to those used in the civilian economy and can be procured at any point in the United States through well-established commercial distribution channels. Between these extremes lies the whole variety of items supplied by the Army. While other factors, such as cost and strategic importance must be taken into account, the basic determinant for the degree of delegation, as well as the items to be delegated, is the appropriate method of procurement.

Within its statutory limitations the Army has already developed a considerable degree of flexibility in adapting its procurement methods to the commodities and the circumstances of supply. It is necessary, therefore, to review briefly the levels in the supply organization to which procurement authority and consequently supply responsibility may be delegated, and the methods of procurement available, before combining these factors into a reasonable pattern of delegation.

b. Levels of Supply Responsibility. The operating levels of the supply system, according to the pattern developed throughout this chapter, are:

- (1) The commodity center (under the present organization, the inventory control point);
- (2) The key depot;
- (3) The distribution depot;
- (4) The post, camp, or station.

c. Methods of Procurement. From the point of view of delegating supply responsibility, there are certain patterns of procurement:

- (1) *Centrally placed and fixed-quantity contracts.* Whether advertised or negotiated and with a wide variety of pricing terms, these contracts are placed centrally with a single source or a group of sources, and specify fixed quantities of supplies with a fixed delivery schedule. There are many items, comprising the larger part of the total dollar value of Army procurement, that must be obtained by this method. *For example*, purely military-type items such as guns, tanks, uniforms, and individual military equipment, such as canteens, packs, etc., cannot be procured on the local market, and still insure uniformity, quality, or the maximum price advantage of volume procurement. Although some of the expensive nonmilitary items such as surveying instruments, machine tools, electrical machinery, etc., can be procured by depots and stations in varying degrees; costs, standardization, large procurement for strategic reserves and many other factors suggest that local control is not feasible. Because of such considerations, many of these items are now regulated by the inventory control point.
- (2) *Local procurement.* Local procurement by stations or depots also employs a variety of contracting methods. However, because this kind of procurement is adapted to obtaining readily available commercial-type items, the largest dollar volume of local contracts is placed through formal advertising. Under the category of supplies suited to local procurement falls a large variety of items of great bulk that are already being distributed by civilian marketing systems, such as coal and fuel oil. Under this category could be included a wide variety of commercial items that are widely distributed by the civilian economy such as paper, pencils, paper clips and other stationary supplies; pipe fittings; small hardware items such as nuts, bolts, screws and nails; electrical items such as wire,

receptacles and light bulbs; housekeeping supplies such as brooms, brushes, mops and soap; and common small hand tools. Many of these supplies that are common to the civilian economy are available at virtually any city or town in the United States.

- (3) *Open end and call contracts.* These contracts are the most flexible type of procurement available to the Army, combining some of the advantages of central procurement, such as price and standardization, with flexibility of local ordering. A basic contract is placed, specifying in a call contract maximum and minimum quantities and the frequency of orders, and in an open end contract only the term of the contract and the unit price, without indicating the total amount to be ordered. The basic contract may be placed centrally as directed by the commodity center or the inventory control point, or may be placed by a depot to provide for the stations in its area.

Emphasis on the use of open end and call type contracts represents an effort to simplify Army procurement and supply system. Like other types of contracts, they are merely tools with which to accomplish a particular purpose; the purpose in this case being to accomplish the purchasing function with the least amount of administrative burden and with the greatest degree of simplification of the supply system. The Army supply system is extremely complicated and expensive, involving control of literally hundreds of thousands of items which the Army must have for the successful accomplishment of its mission.

Where items are of a commercial or near-commercial nature and the commercial distribution system is such as to insure ample and reliable supply, open end and call type contracts may be used to achieve this kind of simplification and economy. The obvious results are fewer purchase transactions, direct shipments from vendor to user, savings in trans-

portation and warehousing costs, and avoidance of the expense of supply and inventory control.

Open end and call type contracts are identified as four specific types: call; open end, requirements type; open end, minimum quantity; and open end, indefinite quantity. Of the four types the call is most definite in contractual obligation and least flexible in quantity and delivery provisions, while the indefinite quantity open end type is the least definite in contractual obligation and most flexible in quantity and delivery provisions. The type to be selected for a given purpose will depend upon particular circumstances but should always be the one which provides the contractual arrangement most consistent with the need for flexibility in quantity and delivery terms.

The *call type* contract is very similar to the fixed-price, definite quantity contract which we know so well. The only real difference lies in the provision allowing delivery instructions to be deferred until a later time.

Open end, requirements type contracts bind the Government to order and the contractor to supply, subject to fixed limitations, whatever the requirements of a particularly designated or described activity may be. The *open end, minimum quantity* contract is one in which the Government guarantees to order from the contractor only a certain minimum quantity, but may at its option order at various times additional quantities up to a stated maximum total. The *open end, indefinite quantity* contract in reality is nothing more than an agreement which stipulates that the Government may order and the contractor may supply, at fixed or determinable prices, the requirements that may arise at designated activities during the contract period.

d. Supply Responsibility at Commodity Center. At present the inventory control points have responsibility for a wide range of commodities,

including commercial as well as military items. The increasing delegation of commercial items away from central control, however, has already been noted. In general, therefore, a commodity center plan must envisage complete central control only of items for which central fixed-quantity procurement is necessary, including commodities of purely military use and certain commercial-type items according to the criteria noted above. In continuing the delegation of other items, attention should be paid to maintaining the benefits of commodity experience at a central point. Review of delegated items through dollar inventory and turnover reports should be maintained at the commodity center, both to appraise the local management of these items and to provide a criterion, if necessary, for bringing them back under central control. In addition, the commodity center should have control of the central placement of open end and call contracts for items in its commodity class, on the basis of locally estimated requirements.

A complicating factor is the division, noted earlier in this chapter, between wide and restricted stockage of commodity classes on the basis of frequency of issue. When studies of issue frequency by the technical services are complete, it will be possible to concentrate attention at the commodity centers upon those items or classes within the general category of centrally procured materiel which are widely stocked and account for the largest volume of issues.

e. Supply Responsibility at Key Depots. To complement the broad stockage of fast-moving, centrally procured items, key depots store slow-moving stocks either at one location or at a restricted group of storage points. Where more than one key depot handles the same commodity and the commodity is centrally procured, central control must be located in the commodity center. But when only one key depot handles a group of items or a commodity class, commodity managers should consider the advisability of delegating complete control of the slow-moving group of class of items to the depot. This would provide the advantage to supply management of segregating control of fast-moving and slow-moving items and would make possible more accurate determination and review of optimum turnover rates. The practice, of course, will vary with the particular commodity grouping and the

items within it. When most items in a commodity group, for instance, are infrequently issued, the key depot for this group might constitute an independent commodity center. Where only certain items in a group are slow-moving, overall control of the group might be kept in the commodity center and responsibility for these items delegated to the key depot.

f. Supply Responsibility at Distribution Depots.

- (1) *Introduction.* The distribution depots store all centrally procured items whose stockage is not restricted to key depots. If central control of issues is added to the other responsibilities of the commodity center, the responsibility of distribution depots for these items is limited to receipt, storage and shipment on orders from the central control point.

To an increasing degree, however, distribution depots are being delegated responsibility for supplying their service areas with commercial-type nonmilitary items and commodity groups. They represent an intermediate point of delegation between central supply responsibility at a commodity center or key depot and complete delegation of responsibility to using activities. The supply responsibility at the distribution depot may take a number of forms, according to the items being handled and their supply and demand status.

- (2) *Depot procurement.* There are many items of a commercial nature which may not be readily available from the sources used by some stations. This is particularly true for those in remote areas. These include such things as odd sizes and types of hardware or electrical fittings. If the depot is, as is usually the case, near an urban center of commercial distribution, it can procure, control and supply such items to the stations in its area. Procurement may be accomplished through fixed-quantity contracts, and in this case the depot must usually maintain stock levels against requisitions by its stations. If

possible, however, it is more desirable for economy of storage and operating costs to place open end or call contracts, particularly for items of infrequent issue, and have shipment made directly by the distributor or manufacturer on call from the stations. Parts for office equipment are an example of the type of item adapted to this form of procurement.

- (3) *Calls by depots against open end and call contracts.* Here, again, economy indicates that delivery orders and calls under centrally placed open end and call contracts should be placed directly by stations to the greatest extent possible, and that the ensuing shipment of goods should return directly to the station with no intervening storage and handling by the depot. In the present situation, however, in which procurement methods are changing, distribution depots still have stocks of items which have been placed on open end or call contracts. Until these stocks are exhausted, it is necessary for the depots to control the calls made against the new contracts. Once these items are nationally exhausted, the authority to call can be transferred to the stations. It is likely that there will still be a few items which may be centrally procured on open end or call contracts from a single manufacturer or from a supplier with a limited number of commercial outlets. Here, the supplier may refuse to entertain the volume and frequency of calls necessary to supply all Army installations directly, and it may be necessary to limit the number of orders by permitting only the distribution depots to place calls and delivery orders.

(4) *Problems of depot supply responsibility.*

- (a) *Introduction.* The delegation of supply responsibility to the distribution depots raises a number of problems for depot management. These are primarily associated with the fact that the balance of supply against

demand is now restricted to the limited geographic area served by the depot. While this enables the depot supply manager to gain a closer knowledge of his customers, it also subjects him to the vicissitudes of local supply resulting from the worldwide program and activities of the Army.

- (b) *Local troop disposition and activity.* Local supply managers must have the same information on the disposition and makeup of troop units in their service area as the inventory control point now has for the national troop program. They should also have information on training activities, on seasonal demand—in fact on any present or planned activity within their area which may affect supply and demand status.
- (c) *Oversea requisitions.* While local supply responsibility in CONUS will continue to be restricted to commercial items, these same items are not so readily available in overseas commands, and requisitions for most of them must still be placed upon the supply system in the continental United States. At present, the great majority of overseas requisitions, other than those placed upon inventory control points, are extracted by the overseas supply agencies to designated ZI depots. It is safe to say that no one factor contributes so much to the imbalance of stock in the depot system as the placing of large overseas requisitions upon individual depots. At least one service is now experimenting with the use of open end and call contracts to fill overseas requisitions for commercial-type items directly from the commercial distributor. Others are using procurement requests for such items placed directly by the port upon a designated purchasing agency. Clearly these methods are restricted to items with a short lead time between order and delivery. Extension of both methods, however,

to cover as many as possible of the commercial-type items requisitioned from overseas, should relieve most of the burden on the individual depots and permit the depot supply manager to plan and control his supply for a definite group of using activities within his own area.

g. Supply Responsibility at Stations. Delegation of supply responsibility to posts, camps, and stations is the final step and means the removal of delegated items from the supply system. An indication of items suited to local procurement by the station has been given above, and many further items may be made available through calls under open end or call contracts, whether placed centrally by the commodity center or locally by the depot. The prices that will be paid by the local post, camp, or station for many of these items will necessarily be more than the purchase price would be under central or depot procurement of large quantities of the same items. However, the cost of central or depot procurement, storage and distribution may well make up the difference in local costs as opposed to costs in large bulk purchases. Furthermore, it is possible that under the dislocations caused by enemy action, the ability of the local garrison to supply itself with such items for some period of time from the community would be of great importance to the national safety. In view of the experience of World War II in maintaining essential civilian industry and construction, even under the impact of an all-out war, materiel allocations could permit this reliance upon civilian supply channels to continue.

While the maximum delegation of supply responsibility to stations offers great advantages in economy and efficiency of supply, it also poses certain problems for the supply system. As at the depot level, local forecasting of demand is difficult without adequate advance information

on local activities and programs. Periodic depot liaison visits as well as the limitations of consumer funding are important aids in controlling the large volume and variety of items that may be delegated, as are dollar inventory and turn-over reports. At present, however, it is not contemplated that financial inventory accounting will be extended to all posts, camps, and stations. Until complete financial coverage of station inventories is attained, the delegation of supply responsibility to stations cannot be controlled to its fullest extent.

A final problem in the control of station stocks is the frequent procurement of nonstandard items. Local suppliers may not be able to provide items which are identical with military specifications. These items are issued to troops and may later be returned into the system, causing confusion and duplication of stock identification and increased difficulties in maintenance. The limits of variation should be clearly specified, and in many cases it may be cheaper to dispose of returned nonstandard items locally than to permit them to enter the system at all.

4. Conclusion

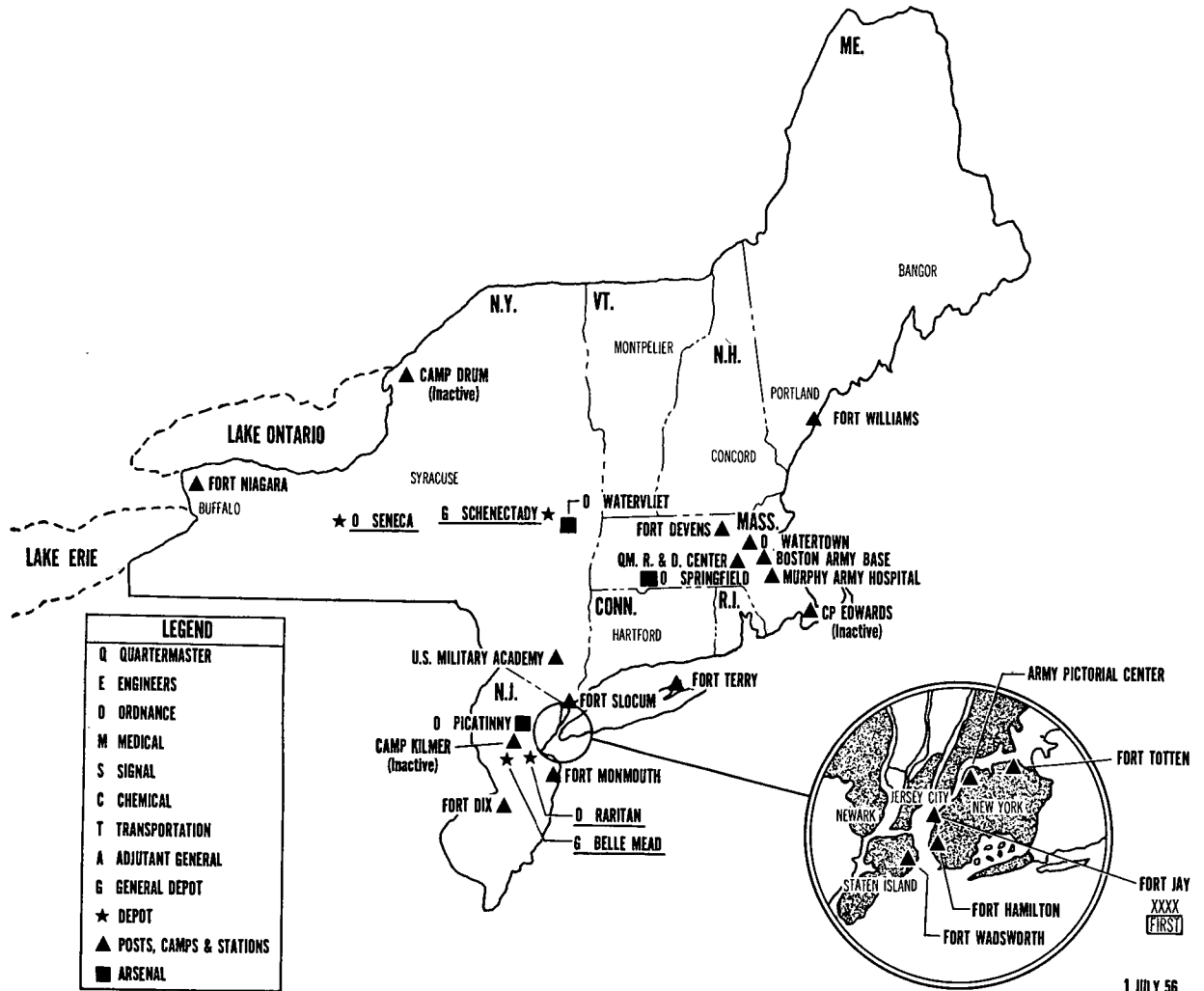
This chapter has examined the current practices and problems of overall distribution management in the Army system, and in this final section has looked forward to the significance of current and contemplated developments. It is not possible to predict the exact form which will result from these changes in operations, organization and management concepts. It is possible to say that the Army, as the largest distribution organization in the world, has presently in hand techniques for effective supply management which are unlimited in scope and opportunity. Analysis, refinement and application of basic supply principles to operations at every level in the supply system are necessary if this opportunity is to be realized.

Chart I

CLASS I AND II INSTALLATIONS

FIRST UNITED STATES ARMY AREA

(LESS TERMINALS, SUB-INSTALLATIONS AND GOCO FACILITIES)



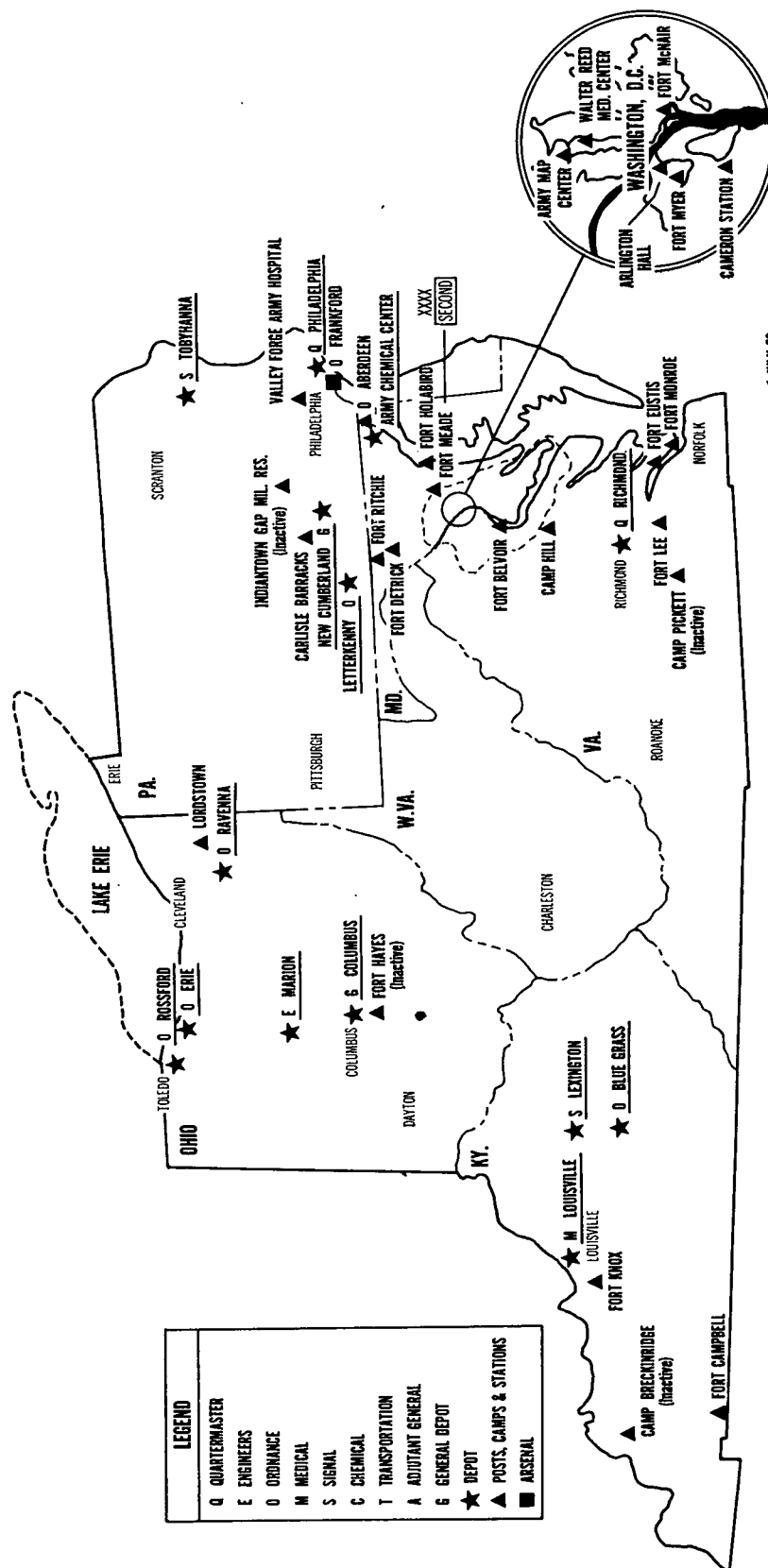
1 JULY 56

Chart II

CLASS I AND II INSTALLATIONS

SECOND UNITED STATES ARMY AREA AND MDW

(LESS TERMINALS, SUB-INSTALLATIONS AND GOCO FACILITIES)



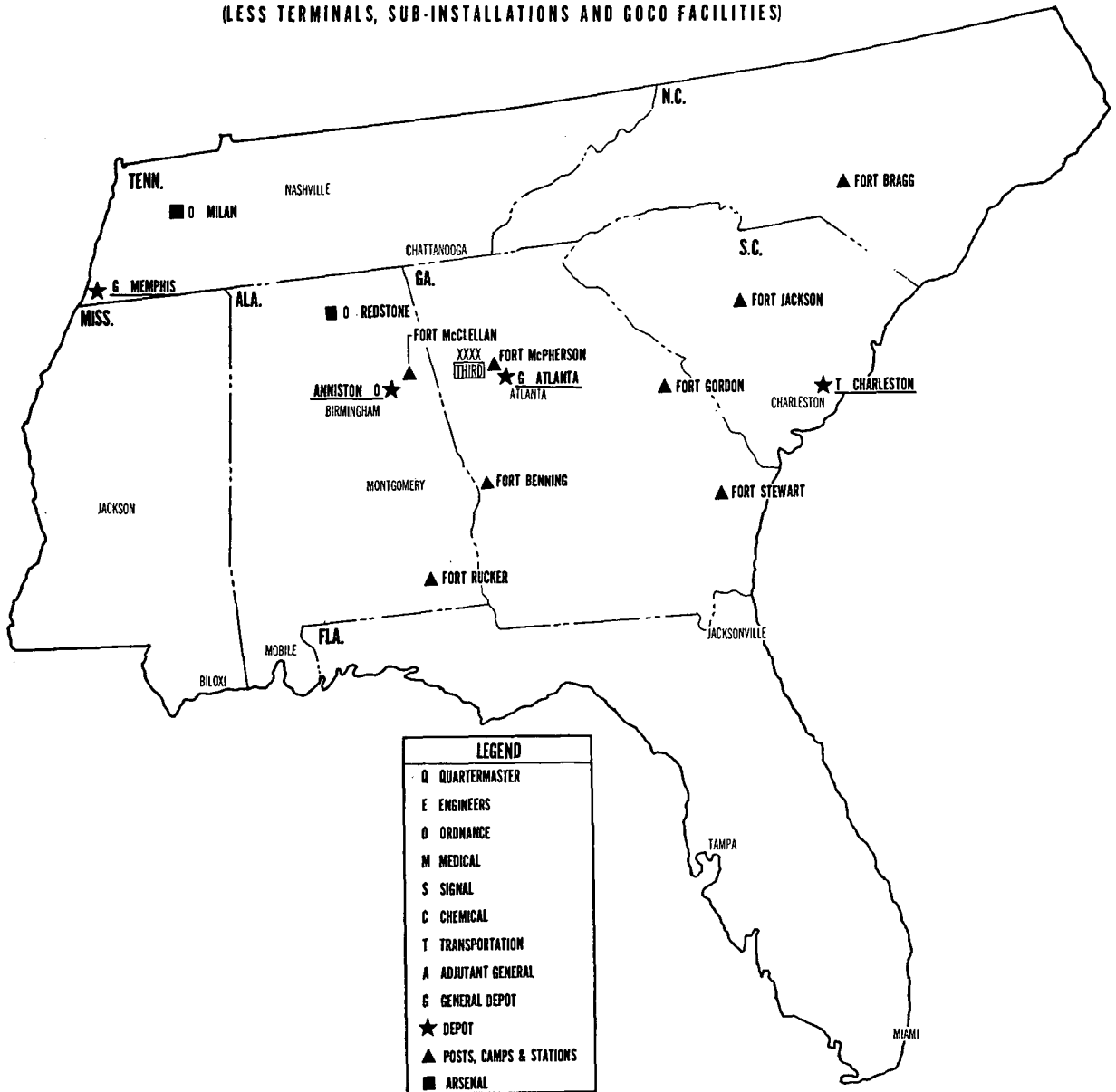
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Chart III

CLASS I AND II INSTALLATIONS

THIRD UNITED STATES ARMY AREA

(LESS TERMINALS, SUB-INSTALLATIONS AND GOCO FACILITIES)



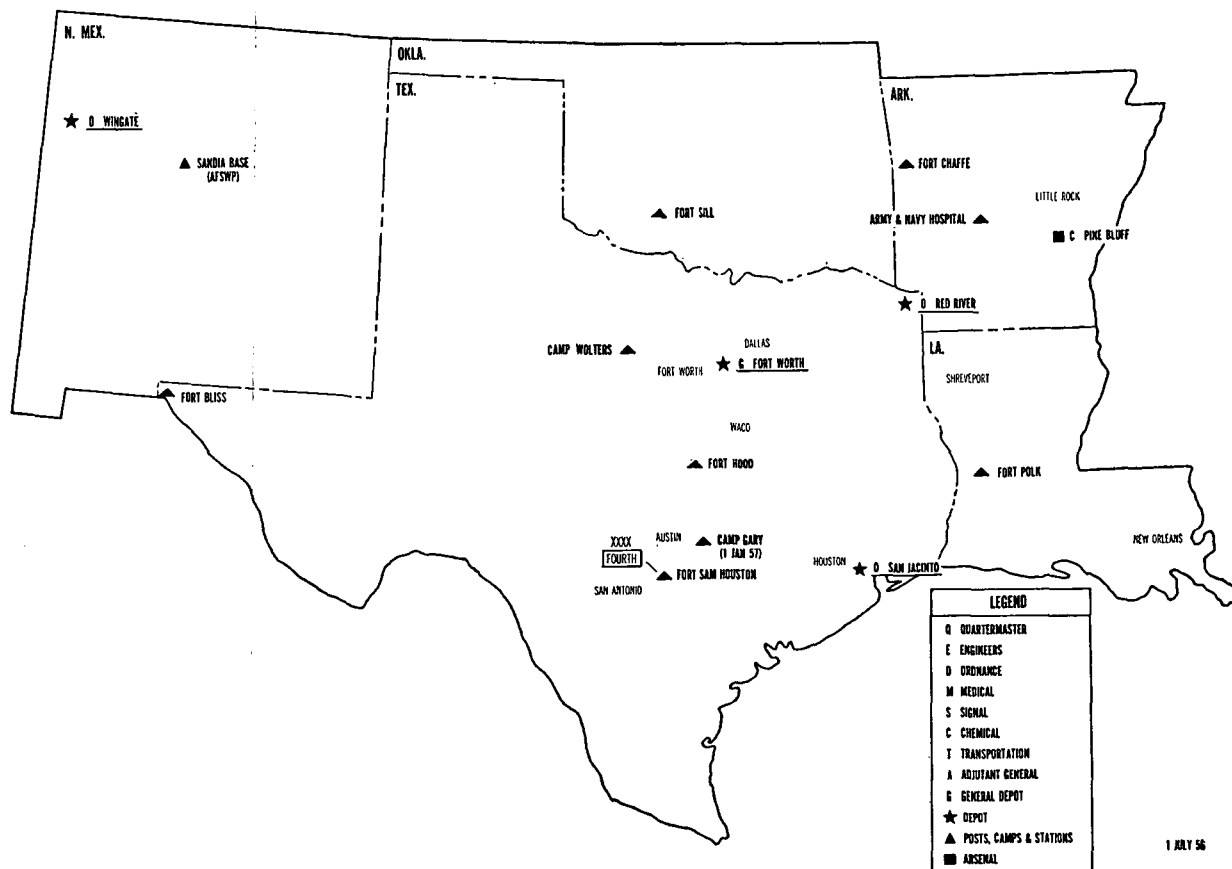
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Chart IV

CLASS I AND II INSTALLATIONS

FOURTH UNITED STATES ARMY AREA

(LESS TERMINALS, SUB-INSTALLATIONS AND GOCO FACILITIES)

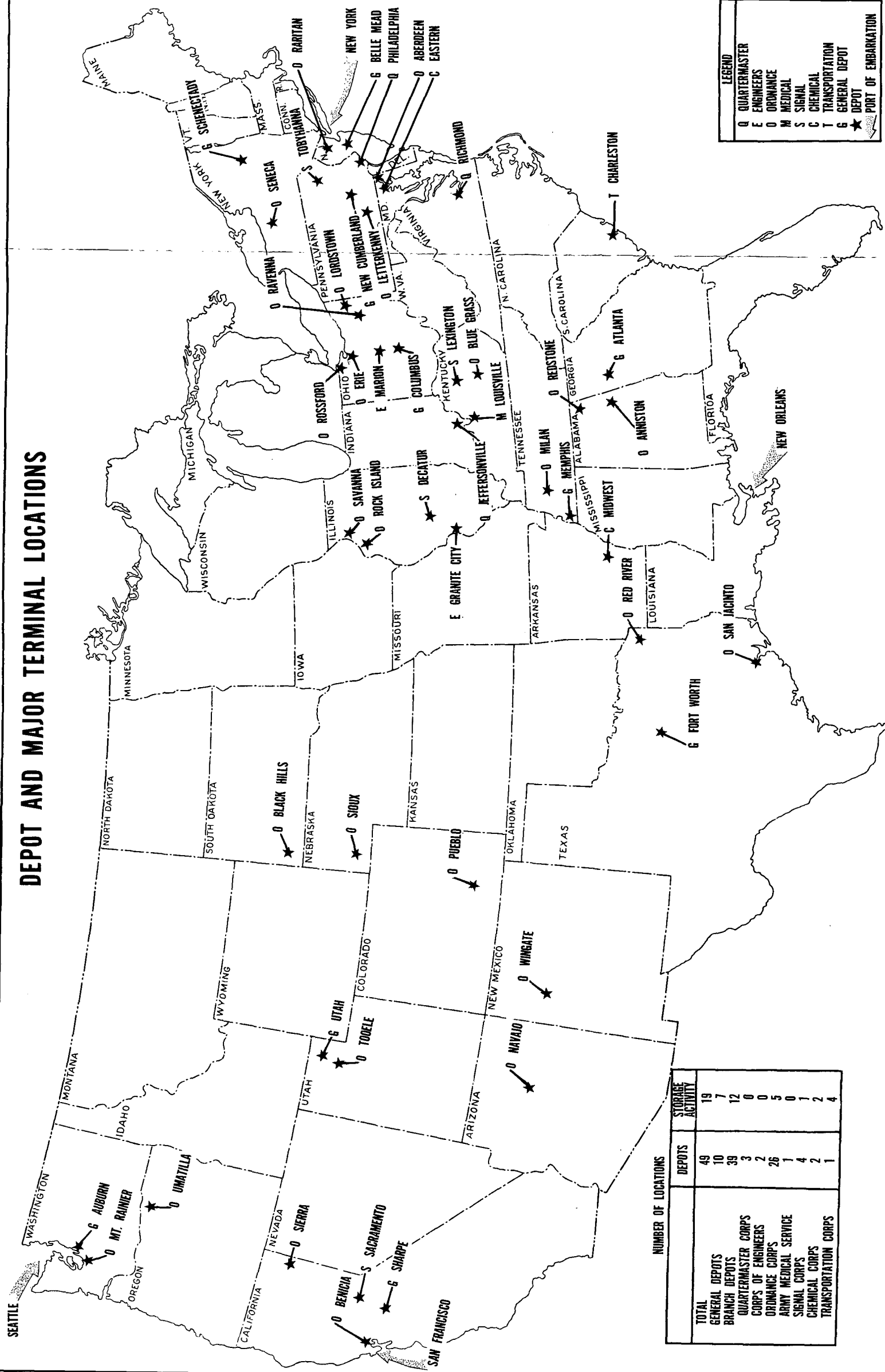


(LESS TERMINALS, SUB-INSTALLATIONS AND GOCC FACILITIES)





DEPOT AND MAJOR TERMINAL LOCATIONS



NUMBER OF LOCATIONS		DEPOTS	STORAGE ACTIVITY
TOTAL		49	19
GENERAL DEPOTS		10	7
BRANCH DEPOTS		39	12
QUARTERMASTER CORPS		3	0
CORPS OF ENGINEERS		2	0
ORDNANCE CORPS		26	5
ARMY MEDICAL SERVICE		1	0
SIGNAL CORPS		4	1
CHEMICAL CORPS		2	2
TRANSPORTATION CORPS		1	4

LEGEND

Q	QUARTERMASTER
E	ENGINEERS
O	ORDNANCE
M	MEDICAL
S	SIGNAL
C	CHEMICAL
T	TRANSPORTATION
G	GENERAL DEPOT
★	DEPOT

 PORT OF EMBARKATION

CHAPTER 4

REQUIREMENTS PLANNING

A. INTRODUCTION

The "Dictionary of the United States Military Terms for Joint Usage" defines requirements as: "The need or demand for personnel, equipment and supplies, resources, facilities, or services, by specific quantities, for specific periods of time or at specified times."

Although the emphasis of this definition is on *specific* quantities for *specific* or *specified* periods of time, it is important to remember that exactness in requirements planning cannot always be achieved, but this does not preclude requirements from being valid even if not reduced to specified numbers.

Obviously, "materiel requirements planning" should be discussed largely in terms of possible war, but the focal point is preparedness and not war.

"Materiel requirements planning" really is material inventory management with major emphasis on planning for the future. One of our major tasks then is to define the nature of the Army's materiel inventory as sound management depends on this determination. To simplify matters, we can divide the Army's materiel into two broad divisions.

The first division is what we call Principal and Major Secondary Items. This division includes the major key items of capital equipment which have a long life expectancy and are budgeted in the Appropriation: Procurement and Production, Army.

In the second division, we can place minor secondary items and repair parts. These are generally the consumption type items for which there exists a recurring demand. Further, these items are generally "stock fund" items since management has been able to intelligently re-

late data from quantitative stock records to fiscal and funding procedures.

These, then, are the major divisions of the Army inventory. Since the items of these divisions are related in use, it follows that in the determination of requirements these divisions must be closely related to effect sound supply management.

Preparedness for modern warfare becomes ever more and more dependent on logistics. The old saying that "for want of a horseshoe nail a kingdom was lost" in principle is more applicable today than ever before. With the vast logistical accomplishment of the United States in World War II, and fresh experience in Korea, one would think that at last most of the answers are available. However, there remain many problems, particularly with regard to the future.

The wide dispersion imposed by nuclear warfare or its mere threat results in drastic changes in logistics planning. The logistician, faced with greater worldwide requirements planning problems, no longer can follow the World War II and Korean concept of a mass accumulation of supply to sustain our forces in combat. He must now plan for the same range of supplies at more locations and must rely on speedier shipments and faster turnover of supplies to present an unprofitable target while maintaining combat effectiveness.

Foremost in our minds in requirements planning is the formulation of an objective, as military preparedness is dependent upon the determination of this objective. The objective of a military force must be the yardstick against which our requirements are measured and evaluated. It becomes a problem for the highest level of government . . . it is a fundamental matter for national policy.

B. LOGISTICS PLANNING ANALYSIS

Chapter 2 discussed, in summary terms, the individuals and organizations responsible for managing the Army's supply system.

Logistics planning is essentially the analysis of a strategic plan and fore structure in terms of requirements and the orderly development of resources to meet the requirements. In war-time, the controlling factors are manpower and materiel. In peacetime, it is money and the planner soon develops a unique awareness of its importance.

On 27 July 1955 the Joint Chiefs of Staff published a revised edition of the Joint Program

for Planning, modifying slightly the Joint Program for Planning of 14 July 1952. This program, like the former, provides for the preparation of joint strategic planning documents covering three separate but related time periods, as outlined in section C that follows. These joint documents are used as guidance for the preparation of service plans, estimates, and programs covering the same time periods. All such documents are revised annually.

The following section C develops in detail the Army Planning, Programming, and Budget Cycle.

C. PLANNING, PROGRAMMING, AND BUDGET CYCLE

1. Planning

Planning for future requirements entails many uncertainties, and the Army planner must consider factors over which the Army has no control. Experience has shown that these uncertainties can best be managed by dividing the planning process into periods of time, and developing, accordingly, long range, mid range and short range plans (chart VIII). The first considers possible conditions of war eight years in the future; the second, much more realistically, four years in the future; and the third, conditions at the moment and for the succeeding fiscal year. All such plans are revised annually to recognize international political changes, developments in pure and applied science and technology, and national budgetary policies. The Army planner works closely with the Joint Chiefs of Staff, which is the coordinating agency for similar plans developed by the Navy and Air Force.

To develop precise plans upon which actual operations could be based for a possible war eight years in the future is manifestly impractical. It is, however, necessary for planners to assess the ability of the national economy to support a major war effort, and to evaluate current and anticipated technological developments so as to determine what weapons and other means may be available. Similarly, the potentialities of possible enemies in these fields

must be evaluated to determine what obstacles may stand in the way of our own national interests. This assessment is the objective of the long-range plan, known as the Long-Range Strategic Estimate (chart IX). The name, Army Requirements Development Plan, has also been given to this estimate; and this, perhaps, describes more accurately its precise function. By taking into account the factors mentioned, it indicates the possible courses of development to which the Army will have to adapt itself. Current technological developments in electronics, nuclear science, metallurgy, aeronautics, propellants, and other fields show the type of equipment which may be available for production in eight years. Equipment and weapons growing out of such developments can radically change the nature, composition, and organization of the Army, and accordingly, tentative organizations are drawn up and efforts made to envision their tactical and strategic employment. By successive annual reviews, the previous year's estimates are revised in light of the current year's actual accomplishments in transforming designs to prototypes, and prototypes to production runs.

With the midrange plan more specific factors are considered. Forces of specific size and composition are scheduled for deployment in selected theaters of war, and their logistical support is carefully calculated. The midrange plan

is an actual operational plan and is designated the Army Strategic Objectives Plan. The objective is stated in terms of political, military, and geographical accomplishments. Although the projected D-Day of the Army Strategic Objectives Plan is four years in the future, the plan becomes the guiding document for the Army's procurement and development during the fiscal year beginning two years in the future. It is drawn up in conjunction with a senior and parallel plan of the Joint Chiefs of Staff in which the missions of the three military departments are assigned. The Army plan is normally approved by the Chief of Staff in June of each year, following which preparations are initiated to attain a calculated degree of readiness for a war which, it is assumed, may start on the first of July four years subsequent.

The first step in this preparation is the development of a second document known as Mobilization Requirements in Support of the Army Strategic Objectives Plan (MOB-R-ASOP). This is a considerably more detailed document. It specifies the number of units of different types which will be required to carry out the operations plan, establishes what their equipment will be, how much shipping and aircraft will be needed for their movement and logistical support, and in general provides the basis upon which the technical services can begin the detailed computation of requirements upon which subsequent budget requests will be based.

2. Programming

Plans have been defined as schemes of action, programs as administrative plans with specific time phases for the accomplishment of interim objectives, and budgets as plans with a price tag. By considering all three activities as successive steps in a continuing process, the function of each falls into position logically. The Army Program System was devised in 1950 for the Department of the Army level only, and extended to subordinate echelons in Fiscal Year 1955. The Program System deals only with the nontactical activities of the Army, and is divided into the Mobilization Programs and until Fiscal Year 1959 the Primary Programs. The former establish an orderly time schedule for the accomplishment of stated goal with re-

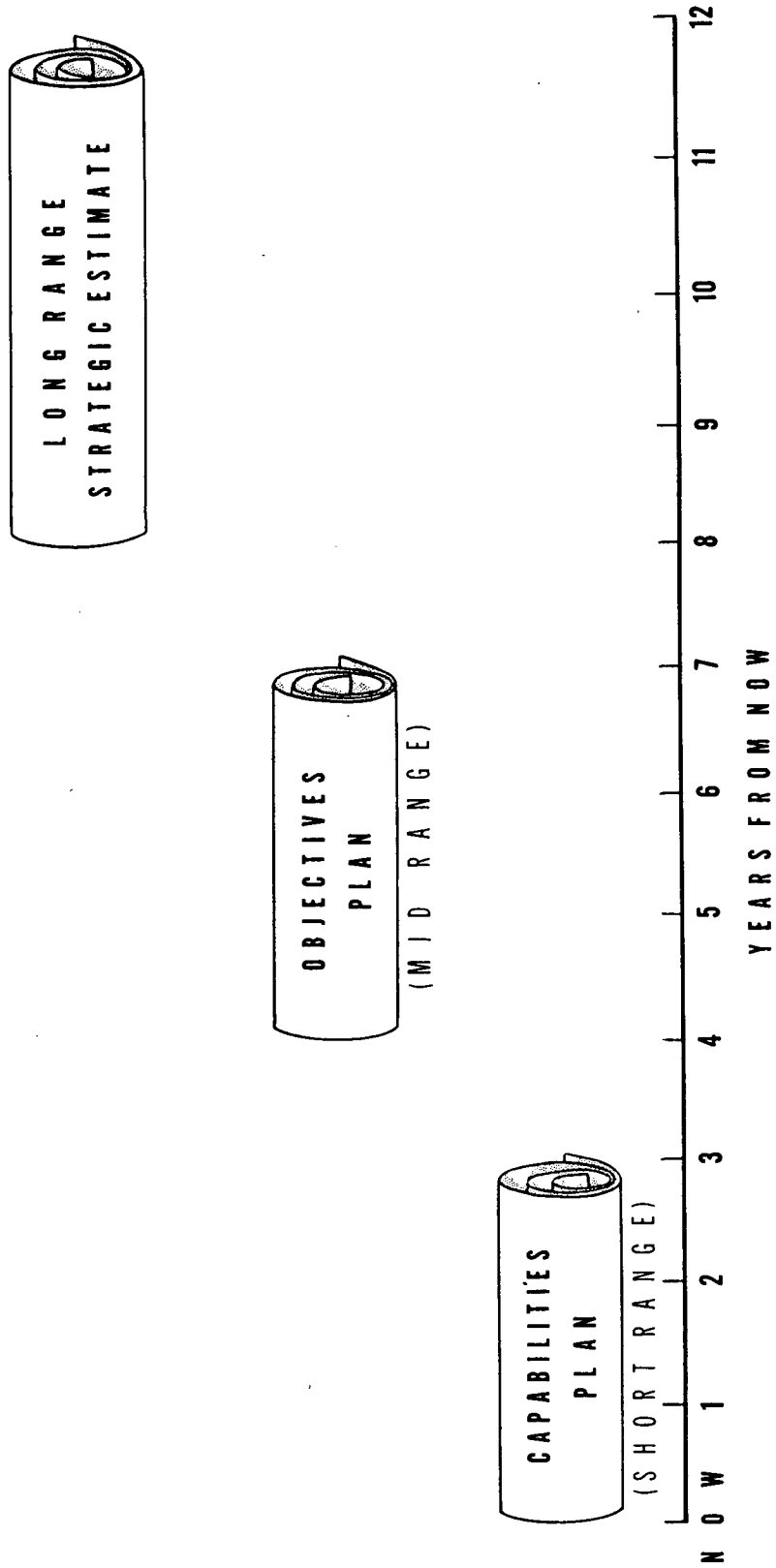
spect to use of available materiel and installations, and for the expansion of the Army itself under mobilization conditions.

The Primary Programs dealt with premobilization army and assigned to the various Department of the Army Staff Sections responsibility for the orderly management of related activities. The Primary Program structure, consisting of 16 programs which existed through FY 58, was criticized for its complexity and the fact that it caused the persons who must execute the programs to report progress across rather than through normal command channels. Restudy of the entire structure resulted in discarding the Primary Program structure and publication of AR 11-1, "The Army Program System;" this regulation defined a revised concept of programming and beginning with the FY 59 cycle, the Army staff engaged in operations under this revised system (chart X). The system under the new concept is based on five control programs: Troop, Reserve Components, Materiel, Installations, and Research and Development. These are listed in column 2 of the chart together with the staff organization responsible for their preparation. The control programs become the repository for basic information guidance and planning information necessary to the operation of the Army, and this guidance is segmented for each of the five fiscal years covered by the program. The third column of the chart, entitled "Appropriation," shows the budget structure which is used as a means to convey specific objectives and guidance required for the budget fiscal year. The appropriations titles are shown in capitals and are underlined. Beneath each appropriation is listed the intra-appropriation structure only to the detail necessary to convey objective guidance. The first indentation consists of the broad budget programs; the second indentations are budget projects for which separate guidance is necessary. These are two areas—Tactical Forces and Army-wide Activities—where it is necessary to go to the budget level to define clearly the single agency charged with the preparation of specific guidance as shown in the fourth column.

The agency responsible for preparing the guidance extracts applicable objectives from the con-

Chart VIII

JOINT CHIEFS OF STAFF STRATEGIC PLANS

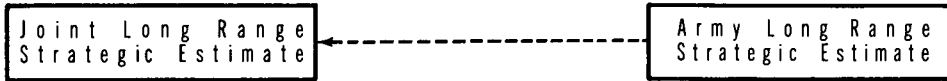
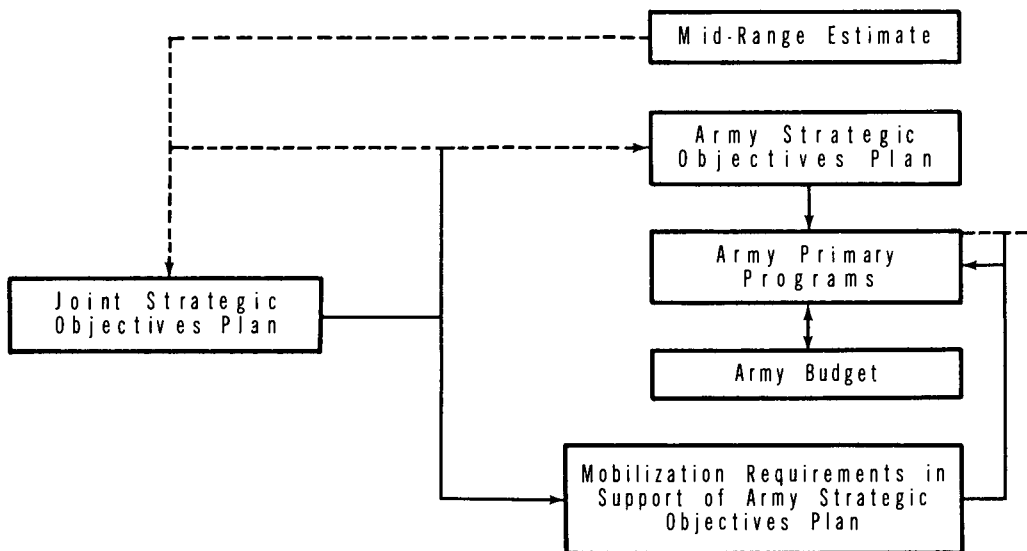
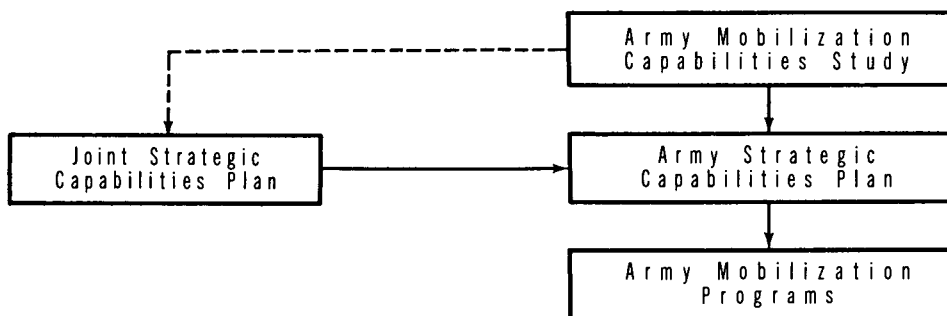


JOINT - ARMY PLANNING INTERRELATIONSHIPS

LONG
RANGE

JOINT PLANS

ARMY PLANS

MID
RANGESHORT
RANGE

LEGEND: — Guidance
 --- Army Initial Position

PROGRAM BUDGET RELATIONSHIPS AND RESPONSIBILITIES

Based on FY 1958 Appropriation Structure

Basic Guidance	Control Program	Appropriation	Guidance Prepared By	Commands			Separate Agencies
				O/S	CONARC	DCSLOG	
ASOP AND DOD DIRECTIVES	TROOP (DCSPER) 						

* Dollar guidance will not be issued to commands where funds are administered through open allotments.

** Consolidated guidance.

trol program for the budget fiscal year and, in coordination with the Comptroller of the Army, includes a dollar estimate required to accomplish the objectives. This effects a complete marriage of program guidance with the budget structure. The Oversea Commands, Continental Army Command, DCSLOG, and Department of the Army operating agencies receives guidance directly from the Department of the Army. Each of these commands and agencies receive a single directive from the Department of the Army containing program and budget guidance for a fiscal year. The Comptroller prepares the guidance by consolidating the information received from each staff agency responsible for a portion as shown on the chart by the "x." In general pattern, the guidance follows the format of a military field order and contains the necessary information needed by a specific commander to do his job for a year. It replaces the numerous program documents and budget guidance memoranda formerly received by a command.

Against this background of national policy, even the details of requirements planning for principal items take on greater significance. Planning must be complete and any figure or estimate may require justification before a number of reviewing agencies both within and outside the Army. At the same time the control of requirements planning for these items is removed to a considerable extent from the Army's supply management organization and is located at higher levels of the Defense Department, the Administration and Congress. While the necessity for adequate control of the many dollars spent annually on principal items demands close review at all levels, it must be recognized that this multiplicity of review and direction raises certain administrative problems. The Supply Control Study itself is an elaborate form, and each study is backed up by hundreds of individual computations, data, and estimates. Interim demands for "spot" estimates of certain items or certain factors further increase the workload of requirements personnel at technical service headquarters and inventory control points. On the other hand, the national policies which affect principal items are subject to rapid change because of emergency, legislation or other factors. It frequently happens that by the time policies have been passed down through

all the responsible agencies outside and within the Army, with interpretation at each level, there is not sufficient time for the agency responsible for actual computation to do an adequate job. Again, questions on the interpretation of policy in terms of specific items and quantities of materiel can rarely be decided with the necessary speed when they must be passed upward through many tiers of the national supply management organization. Within the Army, much can be done to ease the situation if personnel, concerned with the review of requirements and the interpretation of policy at higher levels, would phase their demand upon the agencies responsible for requirements computation so far as possible in accordance with scheduled workloads and established reporting methods. At the Department of Defense level, planning should be sufficiently in advance of the required date to permit phasing of requirements computations, to cover a specific situation, into the normal computing workload, thus avoiding "crash" action, and throwing normal computations out of mesh.

3. Budget Cycle

The process of translating a strategic plan into a budget is extremely complex, and involves general and specific guidance or subsequent review by the Chief of Staff, the Joint Chiefs of Staff, the Secretary of Defense, and the Bureau of the Budget. Therefore, only the critical points in the whole chain of events are considered. Starting with the Chief of Staff's approval of the ASOP by the end of June of Year Y-3, (chart X-1), the MOB-R-ASOP is developed by the end of October of the same year. By the spring of the following year, that is X-2, the technical services will have computed the requirements based on the Plan. Based on such requirements, an estimate is developed by the Army to establish an approximation of the funds which will be required to support the objectives of the plan. As there is normally a considerable gulf between what is theoretically required and what is practicably attainable, substantial adjustment is required before the Army's position for the development of its budget can be firmly established. This position is normally accomplished by the fall of X-1, so

that it may be incorporated into the President's Budget Message which is presented to Congress in January of each year—in this instance January of X-1. There follows, then, Congressional review of the Budget, and funds are finally appropriated normally in midsummer of the same year. Assuming that the funds appropriated are immediately available, and the procurement contracts can be let at once, it would be possible for the Army to get production of needed items started just two years after the completion of the Army Strategic Objectives Plan. As the production of major items of equipment requires normally from nine to eighteen months, it would be on the average one year later before delivery of the first piece of equipment ordered in July of the Target Fiscal Year. As this equipment is being ordered to fulfill the requirements of a war plan with a D-Day of $X + 1$, only one peacetime year is provided for a buildup of quantity production, distribution of the new item through the supply system, issue to using troops, and the training of troops in the use of the particular item.

This idealized sequence of budget preparation, presentation, defense, appropriation, and expenditure of funds is rarely realized in actual practice. There are frequently last-minute changes in national fiscal policies which necessitate radical revisions in earlier estimates, so that the Budget presented by the President may not have had the benefit of two years' preparation. While Congressional action on the Federal budget must be taken before adjournment, adjournment particularly in nonelection years, is often deferred until August or September—that is, two or three months into the fiscal year. After the appropriations have been voted, further delays may be encountered in making the money available for expenditure by the Army. The Bureau of the Budget is required to make apportionment of appropriated funds to the using agency, and further restriction may be imposed by the Department of Defense. Both agencies require justification for specific quantities of funds requested. These justifications often cause delays, with the result that money may not be available for actual expenditure until well into the fiscal year. This results in accelerated spending towards the close of the fiscal year, uncertainties

in manufacturing schedules, hurried contract negotiations, and delays in planning deliveries.

As the planning process is a continuing operation, the effect of these delays is considerably dampened. While preliminary reviews are being made to develop the budget growing out of the requirements needed to support the plan drawn up in year $X - 3$, money is actually being spent to fulfill the requirements which were generated by the plan developed in $X - 4$. It is possible, therefore, to temper current buying, and adjust gradually to conform to radical changes which may exist between the plans of subsequent years. Such a device is a convenience born of necessity. It is at best a stopgap to cure a difficulty that is inherent in the unreasonably long delay between the development of a plan and the procurement of material needed for the plan's execution. Reducing this delay would bring planning closer to execution and make the strategic plan more realistic in light of action which is ultimately to be taken in support of it. In this connection, supply managers would do well to study the plans-budget cycle of large industries, which have similar problems in the procurement of long lead time capital equipment needed for the production of goods whose sale is projected two or three years into the future.

The third type of plan used in the Army planning system is utilized to compensate for the difficulties inherent in the long cycle of the Army Strategic Objectives Plan and the Budget, and is at the same time a periodic stock taking of the Army's ability to perform its assigned mission under the Joint Strategic Objectives Plan. This plan is known as the Army Strategic Capabilities Plan, (ASCP); which, after approval by the Chief of Staff prior to the beginning of the fiscal year, constitutes an operation plan for a war beginning in that fiscal year. In contrast to the Army Strategic Objectives Plan which provides the pattern for shaping the Army's organization, tactics, and equipment in future years, the Army Strategic Capabilities Plan provides guidance and assigns missions to major subordinate commanders for their action in the event of a war starting within the fiscal year. This plan does not influence the budget nor does it assume any substantial improvement in the Army's ability to fight prior to the out-

Chart X

TYPICAL PLANS-PROGRAMS-BUDGET CYCLE-MID-RANGE

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Target Fiscal Year X-3	Plans		NRE					JSOP		ASOP		
	Programs									MOB-R-ASOP		
	Budget											
Target Fiscal Year X-2	Plans	ASOP	JOS Statement of Requirements									
	Programs	MOB-R-ASOP			Program Directive			Controlling Program		Preliminary Program and Budget Guidance		
	Budget				Dept of Defense Guidance					Budget Staff Budget Direction		Estimate
Target Fiscal Year X-1	Plans											
	Programs				BEP Directive	Revised Program				Final Revision		
	Budget	Staff Budg DA Review Estimate	DA Review	DOD Review	BOB Review	Budget Pres	Field BEP	DA Review	QSD-BOB Review Pres			
Target Fiscal Year X	Plans									Annual Funding Program		
	Programs	4th Qtr Review	1st Qtr Review	2d Qtr Review	The Year of Execution - Fiscal Reports					3d Qtr Review		
	Budget											

D-day planned for 1 July following the end of X+1

break of hostilities. It does provide, however, for the mobilization of larger forces and for their deployment after the war has begun. It

is, in effect, a short-range implementing plan of the Army Strategic Objectives Plan which was prepared three years earlier.

D. SUPPLY MANAGEMENT

1. Introduction

The Deputy Chief of Staff for Logistics addressing the students of the Army Supply Management Course in January 1955 made the following statement. "Emphasis . . . has shifted from procurement to control of inventory, requirements computations, and industrial preparedness, which is coming to be more and more the thing that has to be watched. While this shift has been occurring and while this war-to-peace situation has been developing, we've been making a great deal of progress in managing the supply system."

This section will discuss the computation of requirements referred to by the Deputy Chief of Staff for Logistics and will deal separately with the categories—principal items, secondary items, and repair parts.

In terms of what the Army owns, principal items represent 60% of the total Army inventory dollarwise. Adding major secondary items, the percentage rises to 75% (chart XII).

Detailed quantity requirements are computed for two essential reasons:

First, compared to assets, they reflect the current and projected readiness for general war as conceived in a specific plan.

Second, they guide annual funding programs by highlighting deficiencies and overages, and indicating where there is an imbalance in related items.

Great progress has been made by the Army in refining the science of forecasting supply and demand. *For example*, a most meticulous examination of the methods for computing ammunition requirements has been completed. By examination of available World War II and Korean records, a numerical relationship has been developed between expected combat intensities and ammunition allowances. For the first time, there is now an expression of relative combat intensity by division and for Anti-Aircraft Units by time periods throughout the period covered

by a particular plan. Application of one to the other produces a significantly refined forecast of ammunition requirements.

There is more examination necessary, however. Specifically, the problem's complexity is too great to permit a solution in short order. Looking into the future we must constantly bear these questions in mind:

What kind of an Army will we have five to fifteen years from now?

Under what tactical concepts will it be deployed?

What kind of weapons will it use? In what quantities and with what kind of ammunition?

Answers to these questions will have definite bearing on materiel requirements. In this regard, there exists a very real problem that cannot wait until the answers are developed in leisurely comfort. It is necessary that there should be a good indication of what the answers will be for logistic guidance for development of the materiel, procurement and industrial mobilization programs. There is needed a more specific position toward which the Army's efforts can be directed. This goal need not be inflexible. In fact, that is the last thing desired, as it will be changed as warranted. By having such a goal, there will be at least considered on paper what is believed the prospectus in combat materiel would be, and everything would not have to be evaluated by World War II or Korean standards as is necessary now.

2. Materiel Programming

After requirements have been determined, the rate of acquisition must be tempered by national policy, limited by appropriations, and encouraged by the need to progressively improve the Army materiel position. This is accomplished by materiel programming wherein are considered all known influences on the acquisition of materiel. It can best be considered by an examination of most significant facts having a bearing on those influences.

Chart XII

<u>TYPE OF ITEMS</u>	<u>APPROX. NUMBER IN ARMY SUPPLY</u>	<u>APPROX. DOLLAR PERCENT OF INVENTORY</u>	<u>BUDGET APPROPRIATION</u>	<u>SUPPLY CONTROL REVIEW</u>	<u>EXAMPLES</u>
Principal	600-700	60%	P&PA	DCSLOG by item	Tanks Radar Sets Special Clothing Field Wire Gas Masks
Major Secondary	5,000	15%	P&PA	Tech Svcs. by item	Road Building Equipment
Minor Secondary	70,000	10%	M&O M&O Stock Fund	Tech Svcs. by item Decentralized by Tech Svcs. under Staff Policy & Procedure	Fixed Communications Soap Nails Installation kits Paint
Repair Parts	640,000	15%	M&O M&O Stock Fund	Decentralized by Tech Svcs. under Staff Policy & Procedure	Gun Tubes Carburetors Bolts, Screws Radio Tubes
Clothing (except for certain specialized types) and subsistence	—	—	MPA	—	—

*Centrally procured and supply controlled as of 1 Jan 1956.

3. Transition

The major problem confronting the Army today is that of transition from existing types of materiel to more modern types. This problem can be depicted by the weapon changes in the future because of expanding technology and the need to meet the challenge of the increasing capability of a potential enemy.

The real problem of transition is to continually maintain the ability to support combat requirements with adequate stocks and production capacity of current weapons, but at the same time to introduce the modern and highly expensive weapons when they become available from development. Gradually, the modern weapons will replace conventional weapons.

4. Five-Year Materiel Program

The problem of transition, the idea of a long period of uneasy peace, limited availability of funds, and the fact that it takes about three years from Congressional authorization of funds to final delivery of materiel from procure-

ment, combine to require a long view of the materiel needs over a number of years. This is especially true of P&PA items which in the majority are strictly military type, of high dollar unit cost, and require a long production lead time. Also, many of these items, for example in the weapons and communications areas, are undergoing revolutionary and rapid changes in development and design, thereby accelerating the obsolescence of their conventional or less modern counterparts.

This long look is achieved by setting the target at a distance of about five years away and by working steadily toward it through annual peacetime programs. Therefore, the expected money availability is projected into a financial plan. Most significant decisions reflecting the Army's materiel readiness must be taken in light of this financial plan. The level of obligation assumed in the plan stems from the previous presentations to the Congress and to the understanding of commitments made at the secretariat level.

E. PRINCIPAL ITEM PLANNING

1. Importance of Principal Items

Principal items are defined as those which, because of major importance require detailed analysis and examination of all factors affecting their supply and demand. Principal items comprise less than 1% of all items stocked by the Army, they account for 60% of the dollars spent in procurement. Furthermore, their supply and demand status governs the status of a large portion of the secondary items and repair parts in the supply system.

Responsibility for determining principal items rests with the Chiefs of the Technical Services. Following DCSLOG review and approval, the recommended principal item is published by DCSLOG in the Principal Items List (PIL) of the current Materiel Program. Recommendations for deletion of any item follow the same pattern. Refer to chart XII for numerical number comparison of items by category in the Army Supply System.

2. Selection of Principal Items

An item is considered for selection as a prin-

cipal item if it is an end item essential for training and/or combat and if any of the following criteria are applicable:

- a. It is a TOE item, the supply of which is, or is about to be, increasingly active.
- b. It is an item having a high monetary value of either:
 - (1) Stock on hand;
 - (2) Computed procurement requirement;
 - (3) Mobilization requirements.
- c. It is an item whose procurement will be difficult due to:
 - (1) Long lead time;
 - (2) Shortage of strategic materials;
 - (3) Difficulty of manufacture.

3. Control of Principal Items Requirements

For strategic and economic reasons, the supply of principal items is carefully planned and controlled at a number of levels in the Army supply system. Actual computations of requirements are made by the technical services. Requirements are reviewed quarterly or more often, and a standard form for computation and

review (Supply Control Study, DA Form 487) is used in all the technical services. Further, staff review is performed in every case by the Office of the Deputy Chief of Staff for Logistics, and certain selected items from the principal item list are further reviewed by the Office of the Secretary of Defense. The DA Form 487 is also used for major secondary items. Review by DCSLOG is not performed as for principal items except for special cases. (For detailed information on the DA Form 487 and the PIL, consult appendix D to the Materiel Program.)

From the point of view of supply management as well as strategic necessity, the segregation of principal (and major secondary items) from minor secondary items and repair parts is a valid and desirable management technique. Procurement, supply control, and distribution problems are basically different for these various categories of supply. Dollar inventory turnover figures, *for example*, might be severely distorted by the inclusion of items of all categories in the same reporting group. In a group such as materials handling equipment, the few principal items (forklift trucks, cranes, etc.) might well equal or exceed the total value of the hundreds or thousands of repair parts, accessories, and minor end items. It would be impossible in this case to determine an optimum turnover rate or any other standard of supply performance, for such a supply category.

Because of their importance, the calculation and review of principal item requirements receive close management scrutiny at every step in the process. A large number of general studies, directives, and reports have been published in this area, as well as periodic and detailed guidelines to reflect current changes in policies and programs. The purpose of this section is to provide a summary analysis of the methods by which demand and supply of principal items are estimated for peacetime and mobilization conditions, the basic problems encountered in making such estimates and the relationship between principal item requirements and minor secondary item and repair parts requirements.

4. Peacetime Requirements Planning for Principal Items

The basic purpose of peacetime logistics planning so far as the requirements manager is

concerned is to determine the full requirement for stocks to be on hand on M-day in order to support a particular mobilization plan (and the peacetime force expected to be in being at that time), and then to establish a peacetime program to acquire gradually the desired stocks and production capability, consistent with the national policy of maintaining an effective readiness over a long period of uneasy peace. The rate of achievement of full readiness is limited by objectives contained in the current Materiel Program. Such objectives are stated in the terms of forces to be equipped by time periods. In general, priority is given to items of equipment and supply required for the support of forces scheduled for early deployment in the event of war.

5. Estimation of Current and Future Demand

a. Responsibility. The heads of the technical services are responsible for the computation of the Army peacetime and mobilization materiel requirements based on the guidance and procedures contained in the Materiel Program.

There are four elements considered in determining both peacetime and mobilization requirements. These are:

- (1) Initial allowances (initial issue) of authorized equipment to troop units and installations.
- (2) Replacement of equipment worn out or expected to be consumed in combat or training.
- (3) Levels and in transit materiel delivered from suppliers and enroute to the consuming unit (whether in depots or in transit).
- (4) Class IV equipment and supplies. The occasional or contingency nature of its requirements precludes inclusion in TOE's and TA's.

b. Initial Allowance. The first element of demand in the Supply Control Study is the allowance of materiel, both at present and in the future, for the troop strength stated in the Materiel Program. Every troop unit in the Army has a table of equipment or table of allowances listing all items of equipment and quantities which are considered to be the minimum required and authorized for the unit to perform

its basic mission. The number of units of each type is multiplied by the authorized allowance for that type to give the total initial materiel allowance for current demand. This is broken down by areas, such as the continental United States, and oversea commands, and by components, including the active Army and reserve components. Whenever too much equipment is authorized by a TOE, requirements are inflated by that amount multiplied by the units planned for the TOE. Reserve components generally operate under reduced allowances. Any changes in allowances for future periods are computed and entered at the appropriate point in the study. These changes will generally correspond to changes in troop strength or status contemplated in the strategic plan. Thus the planned activation of two National Guard divisions would result in a decrease of all principal item allowances for reserve components and a somewhat larger increase (because of larger allowance tables) in active Army allowances at that time. Allowances for other forces supplied by the United States Army will be as stated in the Materiel Program and will be separately computed and similarly listed in the study.

c. Replacement and Consumption. The demand for future replacement and consumption consists of that part of the initial materiel allowance which is worn out, consumed or replaced through wear and tear and losses under combat conditions. It is computed by applying to the total items in use a "replacement factor," which gives the proportion of replacement required per month for each unit. Thus a replacement factor of .02 for an item indicates that 2% of all such items in use must be replaced each month.

Computation of replacement and consumption, of course, represents an effort to arrive at "true demand" or use of the item. This elusive figure is as much of a problem for principal items as it is for minor secondary items and repair parts, and greater efforts are made to achieve accuracy corresponding to the greater monetary and strategic value of principal items. Replacement factors are carefully studied and constantly revised on the basis of historical data and reports for both peacetime and wartime consumption. However, variations in climate, terrain and conditions of peacetime and combat use make the accurate determination of future

replacement and consumption extremely difficult. No two wars, no two engagements, and no two activities of the peacetime Army are ever pursued under precisely the same conditions. It is a truism that by the time adequate data are gathered for one area and one set of conditions, the conditions will have changed. The margin of error in this element of requirements computation can never be wholly eliminated.

The reports of consumption in themselves require interpretation in order to yield useful results for requirements purposes. In combat situations such as the Korean conflict, for instance, combat units are required to submit Combat Use and Consumption Reports on selected principal items of equipment. Difficulties in analyzing such reports arise from the fact that the information which they present is not always compatible with the basic data required for calculation of replacement and consumption. A troop unit, for instance, may report the loss of a major piece of equipment when it is damaged in an accident or by enemy action and must be abandoned. A maintenance unit then picks up the equipment, restores it to serviceability and returns it to the unit. Unless the previous report is corrected (which is seldom the case), the consumption report may result in an exaggerated demand. Consumption reports must therefore be correlated with maintenance reports from the same area over the same period if even an approximation of true historical demand is to be attained.

d. Levels and Intransit. The approved levels of stock in the ZI depot system and the oversea depot system and the quantities in transit between the continental United States and oversea areas must be computed as a part of principal item requirements. Both levels and intransit time will be computed based on latest data contained in AR 11-8. Quantities required to maintain levels are computed by multiplying replacement demand (the appropriate replacement factor times the initial allowance) by the total number of months in the pipeline for the continental United States and each oversea area. This method further increases the significance of the replacement factor, since it is used as the basis for determination of levels as well as future consumption. Levels are computed for current demand only; they do not change for

future periods unless a planned change in initial allowances, issue experience or troop disposition necessitates a recomputation of all demand figures.

e. Class IV Requirements. As noted in chapter 3, class IV supplies comprise all materiel needed for special projects, such as the construction of a port or a radio station and other purposes which do not constitute a regular demand. The Corps of Engineers and the Signal Corps are responsible for the largest proportion of class IV supplies and of class IV requirements computations. In the construction of a port, for instance, the Engineer units assigned to the work may need heavy construction equipment in excess of that regularly authorized under their TOE's, and will need to install at the port major equipment such as power plants, cranes, and other handling devices which are not included in their own TOE allowances. Requirements for all these items are placed in the class IV category. Again many of these requirements originate from the strategic plan for future operations, and from strategic logistics studies which prescribe in more detail the supply and logistics phases of projects included in the plan. To approach the difficult task of computing class IV requirements for different operations under varying conditions, the "functional component" system is utilized by the Corps of Engineers. This involves basically the standardization of a number of different types of installations. Thus there may be four or five different types of hospitals, two or three different types of Army camps and so forth. A complete bill of materials, from nails to power plants, is prepared for each standard type of each installation, thus making possible the rapid translation of plans into quantitative materiel requirements. Granted that the "functional component" system will apply to only a small percentage of class IV projects, it will do much to alleviate problems where it can be used.

f. Total Requirements. The sum of initial allowances, pipeline, and class IV requirements gives the total current Army requirement for each principal item as of the date of the study. The replacement demand, together with any planned changes in the other demand elements, is projected into the future as changes by period to give phased increases or decreases in future

demand by the Army. Chart XIII summarizes paragraph 5 of this section. Current and future demand and supply for other agencies supplied by the Army, such as the Navy, the Air Force, and the foreign military aid program, are stated separately on the basis of requirements guidance contained in the Materiel Program.

6. Determining Current and Future Assets

a. Current Assets. Current assets consist of stocks in the hands of troops, both active Army and reserve components, stocks at posts, camps and stations, stocks in transit, and stocks in depot worldwide. Information as to the size of these stocks is collected quarterly through the Army Supply Status Reporting System. The reports of current troop stocks should correspond to the current authorized troop allowances. Variations may be expected because of discretionary allowances, seasonal demand, and other factors. Assuming that stocks are available, if the discrepancy between authorized allowances and actual stocks on hand with troops becomes excessive, it indicates either that the TOE requires revision or that enforcement of authorized allowance levels is needed through inspection and command channels. The latter problem is particularly acute for what may be termed "unpopular" items. Many items supplied by the Chemical Corps fall into this category. Since they are not needed for the immediate mission of most troop units, the units will not order their full allowance. Both initial demand and replacement are therefore much lower than the estimates. If inspection enforces compliance with the full TOE allowance, supply discipline tends to be poor. The beaches of World War II were littered with discarded gas masks. The end result, therefore, is often a highly inflated consumption rate, far exceeding the requirements estimate. Improved supply discipline through command channels can do much to remedy this situation.

The final element of current assets is stocks intransit. In the past stocks in transit have been estimated as those stocks which were on the rails or on shipboard between depots, between depots and ports, and between ports. Improved recording methods, such as the use of the Date of Change of Accountability (DCA) method, for intransit stocks should be further de-

PRINCIPAL ITEM REQUIREMENTS

<u>COMPUTATION</u>	<u>RESULT</u>
1. TROOP LIST X ALLOWANCES	INITIAL ISSUE
2. INITIAL X REPLACEMENT FACTOR X MONTHS	REPLACEMENT
3. INITIAL X RF X PIPELINE IN MONTHS	LEVELS & IN TRANSIT
4. STRATEGIC LOGISTIC STUDIES AND SPECIAL OPERATIONAL PROJECTS	CLASS IV
5. TOTAL	GROSS REQUIREMENTS

veloped to reduce the element of guesswork here and the consequent "losing" of assets while in transit.

b. Receipts From Funded Procurement. Future assets include receipts from procurement already initiated or for which funds have been specifically authorized. Since most principal items require long procurement lead times, phased procurement receipts often extend over a considerable period in the future. Current or expected production difficulties and delays must be quickly reflected in the periodic requirements study, since they may change the entire pattern of supply status.

c. Receipts From Rebuild. The final element of future assets consists of receipts of rebuilt materiel from the maintenance program. Unserviceable stock on hand is first listed (though not, of course, included in the computation of current assets) from depot reports by areas. Rebuilding of unserviceable equipment is then phased into future periods to form the basis of scheduled maintenance. Maintenance schedules in the continental United States are controlled by the heads of technical services, while in oversea theaters they are the responsibility of the theater commander. It is important that estimates of receipts from rebuild be extended throughout the whole forecast period of requirements. This is necessary because the estimate of replacement demand includes demand for new equipment required to replace unserviceable stock turned in for repair. If this element of replacement demand is not offset by estimates of future assets from rebuild, overall demand will be overstated. Maintenance scheduling and its significance for supply management is further discussed in chapter 7 of this manual on maintenance and repair parts.

7. Projecting Peacetime Supply Status

The peacetime supply status is obtained for the current period and for each future period in the forecast by subtracting the gross requirements from the assets for that period. Excesses in supply for future periods are available for building up mobilization or other reserves. Once these demands are satisfied, further excesses indicate that current procurement should be terminated or stretched out. Deficiencies in supply for any future period indicate that procure-

ment should be initiated in time to make up the difference. This does not mean, of course, that requirements computations serve directly as a basis for procurement of principal items; the many intervening stages of budgetary review, appropriation and funding often result in modification of the overall Army program or in the shifting of emphasis between segments of the program or even between individual items of supply. Corresponding modifications are then necessary in requirements computations before procurement is begun.

The overall review of peacetime supply status can also serve as a continuing control of accuracy in current demand and supply data and calculations and in past demand and supply projections. Since past experience data on supply and demand are reported on each Supply Control Study, the total assets at the beginning of the past period plus receipts from procurement and rebuild during that period less the total reported demand (replacement and consumption) for the period should equal the reports of current assets.

Since the Supply Control Studies are made at least quarterly, review of successive studies will also permit a check on the accuracy of past projections of demand and supply. In making such a review, intervening program changes must be taken into account.

8. Relationship of Principal to Secondary Item Requirements

Forecasts of principal item requirements form an important element in the computation of requirements for allied minor secondary items and repair parts. A single item such as a tractor of a certain make and model may have hundreds of repair parts and accessories whose supply depends to a large extent upon the future use and distribution of the end item. This relationship is particularly important when changes in the Army program affect requirements for any principal item. A "programming change factor" is published to express the ratio between the current and projected end item populations. Thus if 400 tractors were in use in fiscal year 1954 and program changes indicate that only 300 will be in use in fiscal year 1957, the programming change factor is 0.75. Since minor secondary item and repair parts requirements

are projected over relatively short periods, only program changes for the immediate future, twelve months or less, should be taken into account. Long-range estimates of program changes may themselves be subject to alteration before they can affect minor secondary item and repair parts requirements.

The programming change factor cannot always be applied directly. In many cases a repair part or accessory is used for more than one principal item, and program changes may affect different items in different ways. Generally, it should be remembered that the program changes itself and the requirements forecast

which results from it are plans and estimates, subject to variations and errors. In the example above, the reduction from 400 to 300 tractors in use will not take place overnight. The equipment will be turned in over a period of time, and it is very possible that the tractors remaining in the field will receive harder usage, resulting in a higher demand for spare parts and maintenance materials. The commodity analyst in projecting allied minor secondary item and repair parts requirements should interpret the programming change factor as a trend, along with other elements of demand data, such as issue experience and troop disposition, which have been discussed in section B.

F. MOBILIZATION REQUIREMENTS PLANNING

1. Introduction

Mobilization planning assumes the outbreak of total war sometime in the future. Planning for a floating D-day as a target date is essential. This factor is an important part of the overall strategic plan promulgated by the Joint Chiefs of Staff and includes an enumeration of the military forces, their composition and deployment, which will be necessary to carry out military operations for a stated period of time after the date of the enemy's initial attack, or D-day. D-day is not a fixed date. It changes with each successive plan. M-day is the day full mobilization starts and coincides with D-day.

The troop and logistics aspects of the Army Strategic Objectives Plan are carried out in detail as they are for peacetime planning by the Deputy Chiefs of Staff for Military Operations and Logistics, and the calculation of principal item requirements for the period of the mobilization plan is again delegated to the technical services as indicated in the Materiel Program. For reasons which will be discussed, mobilization requirements planning is performed in close conjunction with peacetime requirements planning and appears as a part of the periodic Supply Control Study.

2. Computation of Mobilization Requirements

a. Elements of Computation. Mobilization requirements are computed as indicated in the Materiel Program for the same elements and

using the same methods as for peacetime requirements; initial allowances, replacement and consumption demand, levels and in transit, and class IV projects. These are broken down into combat area, other oversea areas and the continental United States and are phased out by quarters and half-years over the mobilization planning period. Replacement and consumption rates for combat areas are, of course, much higher than those for peacetime. The typical mobilization requirements pattern resulting from these computations shows first a very rapid increase in requirements corresponding to the initial buildup of troop strength and combat activity. The increase then levels off somewhat as the Army reaches its full strength, but continues at a considerably higher rate than in peacetime.

b. Feasibility. The feasibility of the strategic plan and the ensuing mobilization requirements is constantly tested as the plan is developed. One test which applies specifically to the supply requirements is the "gross national product analysis" developed by the Deputy Chief of Staff for Logistics. This determines the Army's share of the gross national product under the last condition of full mobilization in World War II, and continues with a projection of present mobilization requirements against an estimate of the present gross national product. This method tests the overall extent of the Army's maximum demand upon the national economy and the capacity of the economy to meet it.

3. M-Day Materiel Requirement

At this point mobilization supply planning begins to have a close relationship with current plans and forecasts. The requirements analyst must project against the rapidly accelerating demand after M-day the increasing production capabilities for a given item over the same period. These capabilities are based upon company by company estimates, plans and agreements for post M-day production. Since principal items generally have a considerable procurement lead time, production will lag behind requirements over the earlier period of mobilization. This relationship between demand and supply is expressed graphically by the upper and lower curves on chart XIV. The point in time at which the maximum difference between the two curves occurs is known as "P-Day." The difference between the curves at this point is known as the "M-Day Materiel Requirement" (MDMR), and it is defined as the quantity which should be on hand on M-day to provide for the peacetime U. S. forces, both regular and reserve, which will exist on M-day and to support the current Army Strategic Objectives Plan until deliveries to the military after M-day are adequate with respect to location and quantity.

The M-Day Materiel Requirement, therefore, serves as the basis for computing the quantities of principal items which must be currently stockpiled to form a mobilization reserve. Since M-day is assumed as a certain future date for each study, there will be certain peacetime stocks on hand at that date. The gross peacetime force materiel requirement (PTFMR), therefore, for the given future date is assumed to constitute operating stocks on that date and is deducted from the M-Day Materiel Requirement (MDMR) to give the Mobilization Reserve Materiel Requirement (MRMR). Naturally, if the full PTFMR is not available as an asset, the deficit must be provided for during peacetime.

Definitions of the various terms used above are included in chart XIV.

The technical services add to the computed M-Day Materiel Requirement, the mobilization requirements of the Air Force and the Navy for those items of materiel procured for them by the Army. These requirements cannot be

changed by the Army except with the concurrence of the department concerned. In a similar manner, the Army advises the other two departments of its mobilization requirements where they have procurement responsibility.

A detailed discussion of all phases of strategic and mobilization planning, and of the relationship of the many studies in this area, will be found in FM 101-51.

4. Building Mobilization Reserve Stocks

a. *Objective.* The ultimate objective in mobilization supply planning is to be able to meet all programmed objectives and establish reserve stocks of materiel in peacetime in order to improve military readiness for war. It should be evident that there should be a balance between the various items required; *for example*, between weapons and ammunition. The fulfillment of this objective is contingent on the policies, guidance and priorities established in the Materiel Program.

b. *Deterioration in Storage.* Almost any item will deteriorate to some extent in storage, as discussed in chapter 3. Most mobilization stocks, therefore, although recorded in separate accounts, are not normally physically separated from peacetime operating stocks, but are merged with them to secure stock rotation. Applied to the building of mobilization reserve stocks, the analysis of deterioration requires the consideration of the following factors:

- (1) The storage life of the item. How long can it be stored before it becomes useless?
- (2) The present and projected rate of peacetime consumption. If the present rate of consumption is 60 units per year and the storage life is three years, it is clearly uneconomical to accumulate and maintain total stocks, including peacetime and mobilization reserve stocks, of more than 180 units, no matter how large the MRMR may be. Only the most compelling military considerations should dictate the accumulation of stocks which will deteriorate to the point of uselessness before they can be put into service under normal conditions.

c. *Obsolescence.* The problem of obsolescence is closely allied to physical deterioration. In the case of high-cost items of advanced design it is one of the most serious problems faced by the national military establishment today. Almost all the major equipment of the Army and of the other military departments is subject to constant technological change, which must be kept up if the nation's relative military power is to be sustained. Mobilization stockpiles of critical weapons may, therefore, become obsolete and require total replacement with newer weapons at a cost which would stagger the national economy. There is no wholly satisfactory solution to the dilemma of adequate protection against attack on one hand and the cost of technological change in the other. Several approaches are being used, both within the Army and at the level of the Department of Defense, which afford partial solutions. In some cases new equipment is developed only as far as a production model with no further production or delivery contemplated until the advent of an emergency. In other cases mobilization reserves of equipment which is subject to rapid technological change are limited to a fraction of the theoretical requirement. The proportion of actual stockpiling to the total requirement depends upon:

- (1) The military essentiality of the item;
- (2) The current funds available for procurement;
- (3) The current peacetime consumption rate;
- (4) The adaptability of the item to training or second-line use after it is replaced by a newer first-line item;
- (5) The cost of the item;
- (6) The lead time of the item;
- (7) Whether or not it is a commercial item.

d. *The Modernization Coding System.* In order to reduce the problems of obsolescence, the Modernization Coding System was established during 1954. This system establishes methods and procedures for the modernization of the Army inventory by relating items under research and development to their counterparts already in the supply system. It provides guidance in all areas of effort concerned with modernization, development, requirements, procure-

ment, distribution, utilization and disposal. The proper application of the Modernization Coding System will insure that only essential items are introduced into the system, duplication of items is eliminated and items of new equipment are phased in an orderly manner.

e. *Army Mobilization Capabilities Study.* An overall review of the balance between mobilization reserve programs for different items is afforded by the semiannual Army Mobilization Capabilities Study. This study shows the Army's ability to mobilize based upon two assumed M-days and certain assumptions regarding M-day losses. Consideration is given to personnel, training, materiel, housing, and transportation. A chart similar to chart XV is drawn up with the lower (capabilities) line keyed to the most limiting factor for each period of mobilization. Thus, antiaircraft guns might be the most limiting factor in the first period; transportation, in the next; and howitzers in the third period.

Imbalances and lack of coordination in building mobilization reserves are highlighted by this study, since full attention is brought to bear upon the most limiting factor among the many necessary to fulfill the strategic plan requirements, which are indicated by the upper line of the chart. With such a periodic followup to the building of mobilization reserves, it is possible to initiate remedial action.

f. *Mobilization and Peacetime Production Bases.* Mobilization and peacetime supply planning are most intimately connected in the task of planning production bases as indicated in the Materiel Program. Mobilization planning for production capabilities envisages three types of production bases, chart XVI.

5. Mobilization Reserve Requirements for Minor Secondary Items and Repair Parts

Because many minor secondary items and repair parts are readily available or have short procurement lead times, the accumulation of mobilization reserves is only required for a limited group of the more critical and complex items and items with relatively long past M-day production lead times. Even for this group the number of items is large and planning data, such as production bases and detailed consumption experience, are often unavailable. It is im-

possible, therefore, to plan mobilization requirements to a degree of detail comparable to the planning for principal items. It has been the practice of many of the services to compute mobilization requirements for minor secondary items and repair parts either by applying a multiplying factor, such as two or three, to the peacetime operating requirements, or by designating a certain number of months of peacetime supply as the mobilization requirement. As noted previously, a larger peacetime requirement and a larger production base mean a lower mobilization reserve requirement, and vice versa. This generalization holds for all items which require a mobilization reserve, whether principal, minor secondary or repair parts. The relationship is, therefore, *inverse*; computation of mobilization reserve requirements by multi-

plying peacetime requirements by a constant factor, for instance, will result in overstatement of actual requirements for fast-moving items and understatement for slow-moving items.

In general, closer analysis of mobilization requirements for minor secondary items and repair parts should produce considerable dividends for supply management. Quantities at present designated as mobilization reserves are often in excess of peacetime operating stocks. Methods of obtaining a closer approximation of actual mobilization requirements may result in significant reductions in these quantities, and consequently in the total inventories which must be maintained in the supply system.

Additional material on mobilization requirements for repair parts is covered in chapter 7.

G. PLANNING TO MEET FUTURE DEMAND FOR SECONDARY ITEMS—REPAIR PARTS

1. Introduction

The preceding sections have been concerned with the needs of satisfying immediate demands from stock presumed to be on hand. This section deals with planning for future demands, the need of keeping stock enough, but not too much, in the bin. The supply control activity plans to keep stock available on a worldwide basis, directing initial distribution of newly procured stocks to Army depots from Alaska to Afghanistan based on anticipated demand. To assist supply control points in anticipating this demand, the *stock* control activities furnish data on past experience. These data include information on depot stock status, analysis of depot issues, end item density, and national availability. It is necessary that stock and supply control points maintain constant close liaison to assure that there is eye-to-eye agreement on these raw materials of requirements computation.

For ease of management, the mass of items for which future demand must be predicted is divided into principal items, secondary items, and repair parts. Secondary items are in turn classed as major and minor.

2. Major Secondary Items

Major secondary items are those budgeted in the P&PA appropriation, but not selected as

principal items. Usually these items have long lead times and cost more than \$500. Some items funded in M&O appropriations are considered to be, and are treated as major secondary items. Major secondary items are controlled and their supply control studies prepared as for the principal items, but they are reviewed by the technical services instead of at DCSLOG level.

3. Minor Secondary Items

Minor secondary items are all remaining items which do not fall into one of the above categories. Generally, they are characterized by short lead times, low value, and ease of procurement.

4. Repair Parts

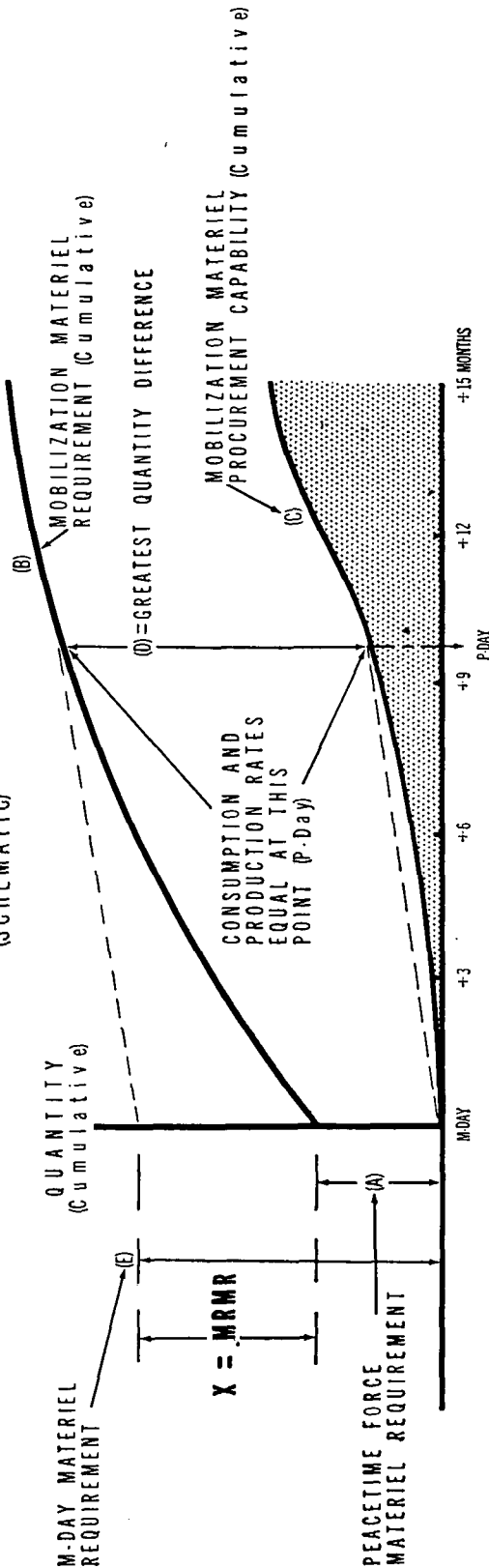
Repair parts are all elements, materials, components, assemblies, or subassemblies required for the maintenance and repair of an end item.

5. General Characteristics

It is interesting to note that minor secondary items and repair parts while constituting the bulk of the items in the Army Supply System, account for only about 25% of the procurement dollars spent by the Army. On the other hand they account for 85% to 90% of the entire workload and costs of the distribution system. In these categories then, the manager searching

DEVELOPMENT OF MOBILIZATION RESERVE MATERIEL REQUIREMENT (MRMR)

(SCHEMATIC)



(A) PEACETIME FORCE MATERIEL REQUIREMENT is the quantity of a particular item required to equip and train the planned peacetime U. S. forces, both Regular and Reserve, and support the scheduled establishment through the normal appropriations and procurement lead time periods, and in addition, those non-U. S. forces whose logistic support has been assigned to a specific Service.

(B) MOBILIZATION MATERIEL REQUIREMENT is the total quantity of a particular item required to support completely the effective JSOP from M-Day.

(C) MOBILIZATION MATERIEL PROCUREMENT CAPABILITY is the estimated total quantity of a particular item which can be acquired between M-Day and any specified date thereafter.

(D) Maximum difference between B and C determines magnitude of M-Day Materiel Requirement. It also determines P-Day. P-Day is the earliest point in time after M-Day at which the rate of production of an item available for military consumption equals or exceeds the rate at which the item is required by the Armed Forces.

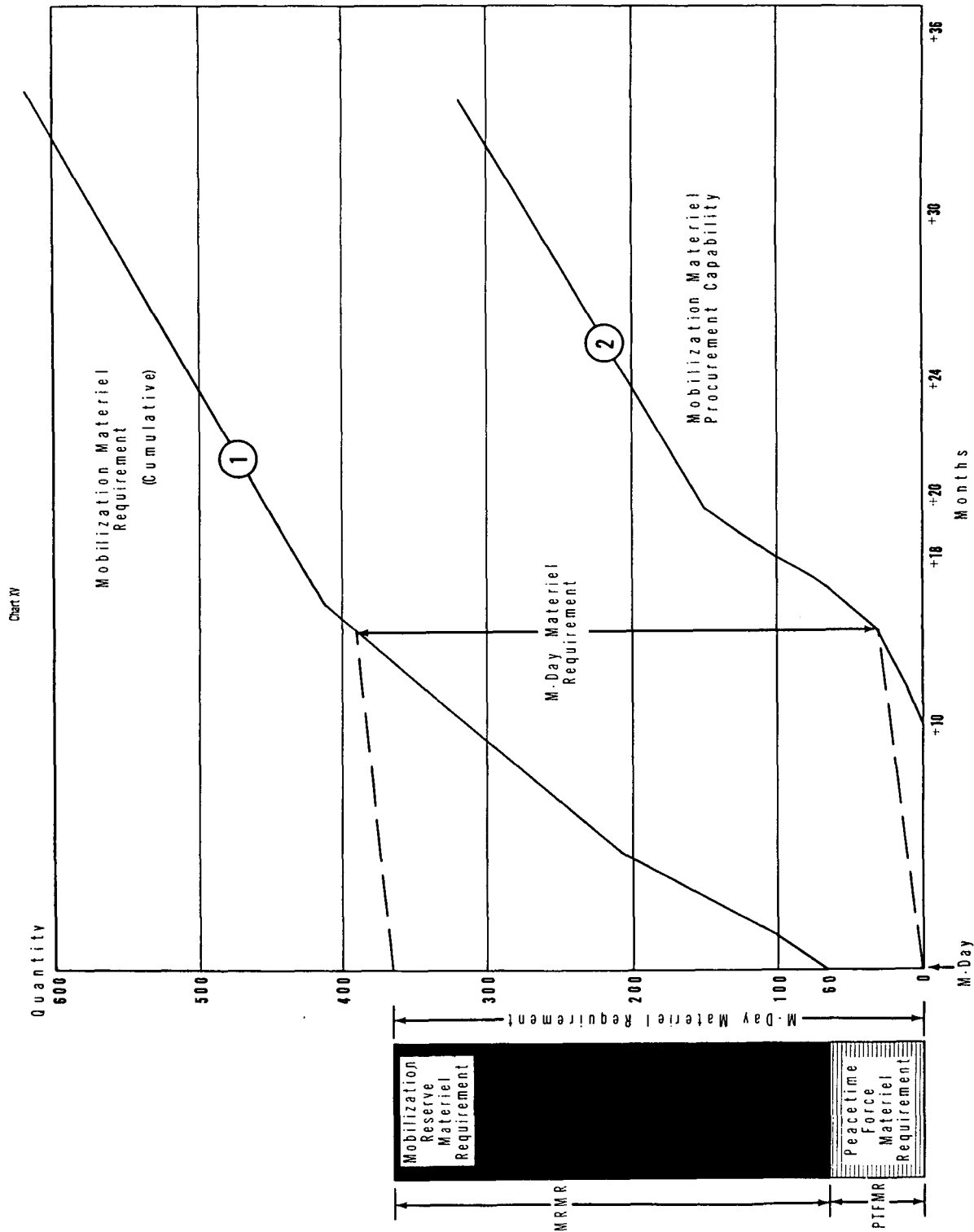
(E) M-DAY MATERIEL REQUIREMENT is the quantity of a particular item required to be in military stocks on M-Day in order to support completely the effective JSOP until deliveries to the military after M-Day are adequate with respect to location and quantity.

(X) THE MOBILIZATION RESERVE MATERIEL REQUIREMENT (MRMR) is the quantity of any item required to be in stock on M-Day in addition to the Peacetime Force Materiel Requirement, in order to satisfy the M-Day Materiel Requirement.

FORMULA

$$\begin{aligned} B &= C + D \\ D &= E \\ E &= A + X \end{aligned}$$

EXTRACTED FROM ICS POLICY MEMO APPROVED 12 JAN 54
ICS POLICY MEMO OF 30 MAR 50 RESCINDED



MATERIEL PROCUREMENT CAPABILITY

FACILITIES ON M-DAY

① IN OPERATION

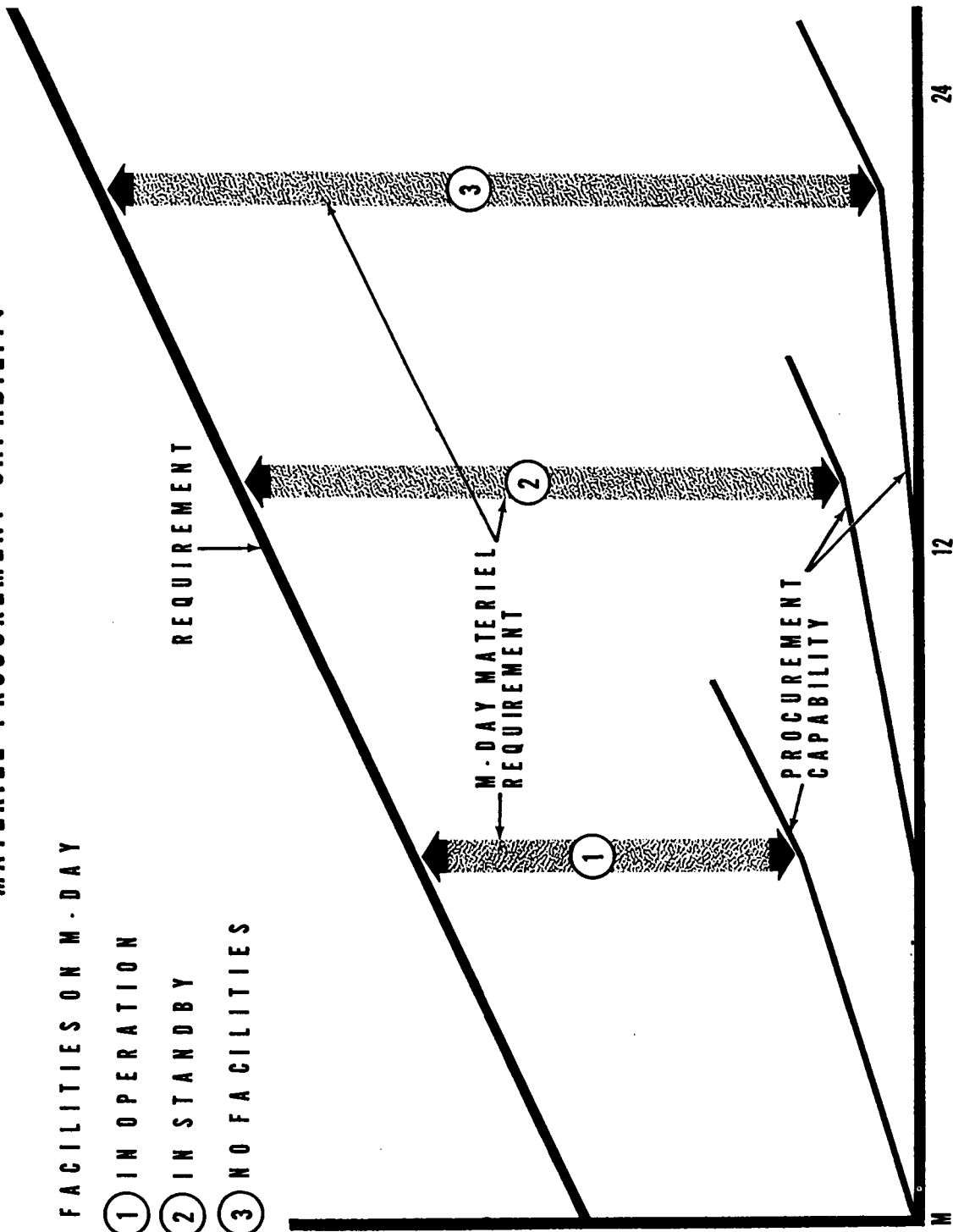
② IN STANDBY

③ NO FACILITIES

REQUIREMENT

M-DAY MATERIEL
REQUIREMENT

PROCUREMENT
CAPABILITY



for economies will look first to inventory control and supply transactions.

6. Minor Secondary Items and Repair Parts Requirements

Each head of a technical service exercises worldwide control over minor secondary items and repair parts of his responsibility from a closely supervised central supply control point. With approval of DCSLOG, heads of technical services may decentralize supply control to installations where complimentary stock control, procurement direction and maintenance control points are located. This allows more effective liaison and operation. In such cases, the operation remains under direct supervision of the head of the technical service.

Before February 1955, all minor secondary and repair parts items received about the same degree of attention in determination of requirements. Studies showed that a relatively small number of items accounted for most of the dollar value of issues. DCSLOG therefore authorized varying degrees of control based on annual dollar demand. Items are stratified according to value of annual issues as:

a. Low dollar value items (\$0 to \$1,000 annual issues).

b. Medium dollar value items (over \$1,000 but not exceeding \$10,000 in annual issues).

c. High dollar value items (in excess of \$10,000 in annual issues).

Depots were allowed to carry more stock of the low annual dollar demand items. A standard method for computation of requirements for minor secondary items and repair parts is now used in all technical services (see AR 710-45).

7. Steps in Determining Secondary Item Requirements

The basic steps are as follows:

- (1) Establishment of a required number of days of supply representing the minimum stock which must be on hand plus that which should be on order to meet future demand without running out of supplies.
- (2) From past experience of issue or demand plus other known factors, to predict the quantity of stock required for

the period established in the first step. This quantity plus quantities currently due out plus authorized reserves, is the gross requirement.

- (3) In determining how much to buy, total assets are subtracted from the gross requirement, the remainder is called the net requirement.

8. Establishment of Gross and Net Requirements

The following formula is used in computing requirements for procurement as of low dollar value items. It illustrates the steps in paragraph 7 and the theory behind the more detailed computations prescribed in AR 710-45 for other dollar value category items:

Requirements	Quantities
Depot safety level (¹ 1 month) -----	_____
Procurable MRMR ² -----	_____
Forecasted demand during procurement lead time (_____ months) -----	_____
Recurring ³ ----- (_____)	_____
Nonrecurring ³ ----- (_____)	_____
Forecasted demand during procurement cycle -----	_____
Recurring ³ ----- (_____)	_____
Nonrecurring ³ ----- (_____)	_____
Dueout -----	_____
Gross requirement -----	_____
MINUS:	
Assets:	
Serviceable stock on hand as of stock status cutoff date ----- (_____)	_____
Less estimated consumption during stock status lag time ----- (_____)	_____
Net stock on hand -----	_____
Forecasted receipts -----	_____
From procurement ----- (_____)	_____
From returns ----- (_____)	_____
From rebuild ----- (_____)	_____
Total assets -----	_____
Net requirement -----	=====

¹ Unless otherwise established by subsequent instruction.

² See definitions paragraph 3, AR 710-45.

³ Recurring and nonrecurring demands will be included in one combined total for low dollar value items.

9. Graphic Presentation

This same situation is depicted on chart XVII as a continuing process.

As shown above, the computation of requirements for these items which produce the biggest workload in the supply system is, in theory, a simple exercise.

In practice, there are many unknowns injected into the problem. A consideration of the unknowns and the action and reaction within the system will make it abundantly clear that the procedure sketched above can seldom be applied rigidly or mechanically. The judgment and experience of the analyst must govern and may override the procedure in the interest of efficient planning and control.

10. Intangibles

Since the analyst at the technical service and supply control level is at the end of long lines of communication, it is frequently difficult for him to determine how old and how accurate are his raw materials, the reports furnished him by the stock control point to show past experience. Often the cost of obtaining exact information will exceed the value of the quantity of items in question. If his knowledge of future developments is not current, he may be surprised and/or astounded by unforeseen demands. In short, he is more than usually dependent on others for his facts and must have a detailed knowledge of the system which produces those facts and be quick to see trends, detect inconsistencies, and adjust his own actions. In this respect, the Field Stock Control System is expected to provide better demand for consumption data particularly for repair parts requirements computation.

11. Detailed Examination of Factors in Planning To Meet Future Demands

a. Supply Control Review Cycle. Since it is impractical and uneconomical to review all of the vast number of items in the supply system more frequently, the technical services review the status of their items at intervals of not more than six months as stipulated in regulations, unless specifically approved by the Deputy Chief of Staff for Logistics.

A semiannual review is most common. The review is the primary activity of the Supply Control Group. It provides the analyst with the opportunity to examine past issue and demand experience, predict the demand for the next period and adjust his stock by appropriate action. In order to make the most efficient use of administrative and clerical time, some action should result from the cyclic review; therefore,

with the exception of low dollar value items it is set to correspond to the ordering cycle.

In addition to the normal review, the technical services also review when an item reaches a level of supply designated as the reorder point. This safeguard minimizes the effect of unusual demand but does not warn the analyst of falling demand and the resulting accumulation of excesses. Excesses are caught at the normal review periods. The most economical length for the review cycle is determined primarily by the frequency of issue and dollar demand. Generally speaking, an item with high dollar demand should be reviewed more frequently than one with a low dollar demand.

b. Economical Order Quantities. The principle stated above for the optimum frequency of review and reorder is that fast-moving stocks should be reordered more frequently than slow-moving stocks. To analyze this principle and obtain a more exact workable method for fixing the length of the review and reorder cycle, it is necessary to take into account three important factors: the dollar demand for the item, the "cost to hold," and "cost to procure."

Since the end in view is economy, demand must be expressed in dollars in order to make it comparable with the other cost elements which are involved in procuring, storing and distributing the item. The dollar demand for any item or category of items is now available to stock managers in the Army system through the techniques of Financial Inventory Accounting. The other costs of procurement and storage are not at present available in a form which would relate them to inventory items or categories. The cost to procure includes the actual costs of making the purchase, receiving, inspection, and accounting. This will be a relatively fixed sum; it does not cost much more to process a contract in the amount of \$50,000 than in the amount of \$10,000. The cost to hold inventory includes the interest on the investment, obsolescence, inventory shrinkage and as a major factor, the variable elements of the storage and warehousing cost. This cost will vary with the size of the inventory being held.

Studies of the relationship of these cost elements indicate that the minimum total cost for

supplying the item is obtained when the cost to hold is equal to the cost to procure. *For example*, the annual dollar demand for an item may be \$800. The procurement cost may be estimated at \$100 and the holding cost at 12.5% of the initial value of the inventory in storage. If the item is procured once a year, the cost of holding the inventory for a year will be 12.5% of \$800, or \$100, the same as the procurement cost. Now if the annual dollar demand increases to \$8,000, and procurement is still made once a year, the cost of holding will increase to \$1,000. The question then is: Would it not be cheaper to procure more often and hold less inventory? If procurement is made twice a year, *for example*, the procurement cost would be doubled to \$200, but the cost of holding the inventory would be halved to \$500. The total cost of supplying the item would thus be decreased from \$1,100 (\$100 procurement cost plus \$1,000 holding cost) to \$700 (\$200 procurement cost plus \$500 holding cost). The situation of course would be reversed if annual dollar demand should be substantially decreased.

In order to express this changing relationship and to work out the most economical frequency and quantity of orders at different levels of annual demand, a formula has been worked out in industrial practice and is now under study by the armed services. It is as follows:

$$X = \sqrt{\frac{D \times Ch}{Cp}}$$

where: X is the most economical number of orders per year;

D is the annual dollar demand;

Ch is the cost to hold, expressed as a percentage of the annual dollar demand;

Cp is the cost to procure.

Using this formula, with the figures assumed above, we may derive the following annual dollar demands necessary to justify various frequencies of procurement: Annual demand value required for:

	Annual demand value
1. Monthly procurement.....	\$115,200
2. Bimonthly procurement.....	28,800
3. Quarterly procurement.....	12,800
4. Semiannual procurement.....	3,200
5. Annual procurement.....	800
6. Biennial procurement.....	200

The optimum order size, in turn, would be:

	Optimum order size
1. Monthly procurement.....	\$9,600
2. Bimonthly procurement.....	7,200
3. Quarterly procurement.....	3,200
4. Semiannual procurement.....	1,600
5. Annual procurement.....	800
6. Biennial procurement.....	400

If the figures in these tables are applied to the example in chart XVII, and a value of \$4.00 is assumed for the item, the annual dollar demand will be $1,200 \times \$4.00$, or \$4,800. Clearly this makes it uneconomical to order the item every three months; a five or six months' review cycle would yield a considerable saving.

Analysis of economical order quantities offers opportunity for economy to the stock manager at the inventory control point. Application of judgment is essential when finally deciding on the quantity of any given item to be procured. In the case of very small procurement quantities, the following questions should be asked before deciding that it is an uneconomical buy:

(a) Should the item be retained in the Supply System?

(b) Have the possibilities of local procurement or local fabrication either commercially or by military shops been completely explored?

(c) Have small businesses been thoroughly solicited?

If the answer to the above questions is yes, exception to maximum procurement quantities may be requested of the Deputy Chief of Staff for Logistics.

c. *Maintenance of Operating Stock Levels.* After a regular review and order cycle has been set up, and material is moving from the manufacturer through the supply system to the consumer, the next problem for supply management is to phase or schedule the movement of stock from the manufacturer into the system so that it keeps pace with the movement out of the system to the consumer and does not build up excessive stocks in storage at any given time.

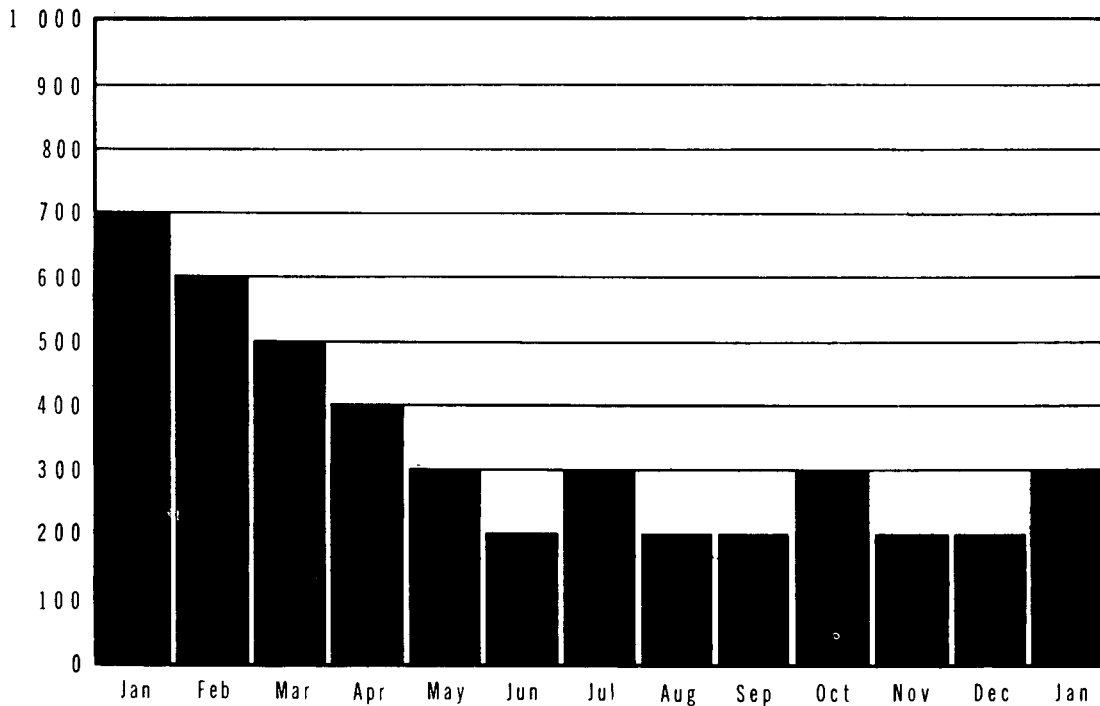
Chart XVII serves to illustrate the relationship between the order cycle and the scheduling of deliveries. If the review cycle is three months and the other factors including demand remain constant, the stock analyst will order in three months' supply at each review. If this amount

Chart XVII

Regular demand 100/mo.

Procurement cycle..... 3 mos.
 Safety level..... 1 mo.
 Procurement lead time level..... 6 mos.
 Dues out 0 mo.
 Procurable MRRM 0 mo.
 Total Level..... 10 mo.

Units on hand



Months

	January review	April review	July review
On hand	700	400	300
Due in	0	300	400
Assets	700	700	700
Gross requirement.....	1,000	1,000 *	1,000
Net requirement for procurement...	300	300	300
Delivery schedule	200 July	200 Oct	200 Jan
*No dues out	100 Sept	100 Dec	100 Mar

is scheduled for a single delivery at the beginning of the period, stock will rise to four months' supply and descend as issues are made during the period to the safety level of one month's supply. If the economical review and reorder cycle is changed to six months with a single delivery, seven months' supply would be on hand at the beginning of the period. It can readily be seen that a delivery schedule of this kind would cause waste of storage space, excessive storage costs and a considerable loss of flexibility in meeting demand. It is necessary therefore to define the maximum inventory which should be on hand at any given time. This maximum inventory is the stockage objective.

d. Level of Stock on Hand. The level of stock which should be on hand in the system under normal conditions is called the stockage objective. It corresponds to the previously discussed review cycle or operating level required to meet expected demands on the system during the normal review cycle plus the safety level.

e. Turnover Rates. The review cycle or operating level bears a close relation to the turnover rate, or "stock turn." The turnover rate is simply a measurement of the frequency with which the average inventory is exhausted and replenished during a stated period of time, usually a year. As a formula, it may be expressed as follows:

$$\frac{\text{Total issues}}{\text{Average inventory}} = \text{Turnover rate}$$

Thus, if the average inventory for the year was 5,000 units and total issues were 15,000 units, the turnover rate would be 3.0. The most complete and accurate method of determining average inventory would be to take the beginning inventory statement for the period plus the inventory statement at the end of each month during the period and divide by the total number of inventory statements (thirteen for a period of twelve months). Since this detailed information is not always available, a more common method is to total the beginning and ending inventory statements for the period and divide by two.

The use of turnover rates supplies a quick and effective measure of supply management performance. It lends itself to a great variety of comparisons, and should be used by the stock manager at the supply control point to evaluate

his own activity and by higher management to evaluate the overall performance of the supply system. To realize the full effectiveness of turnover rates, managers must have a means of consolidating activity into manageable and meaningful categories. Inventory turnover rates which deal with quantities alone have to be studied on an item-by-item basis. A comparison of the large quantity turnover rate of thumb-tacks worth only a fraction of a cent combined with the low quantity turnover rate of expensive transits would be meaningless. Financial inventory accounting converts the quantities of different items to the common denominator of dollars and permits a rapid evaluation of turnover rates by classes, rather than by individual items.

The effectiveness of this evaluation is largely predicated upon the homogeneity of items in the selected classes of items. Certain types of commodities such as stationery and hardware should be turned over at a faster rate than more expensive long lead time items such as micrometers, calipers and other precision instruments. The commodity classifications used in the past by the services have, with minor exceptions, been individually designed, and although the same type of item, and in many cases the identical item, was stocked by more than one service; differences in classification made it impossible to relate stock turn of the same commodity between services. However, the commodity classification systems used were too broad for effective analysis of turnover rates. *For example*, most services had a single class for hand tools that included consumable items such as files, drills, and taps; large hand tools such as pipe wrenches and powerdriven hand tools; and precision hand tools such as micrometers, calipers, and gages. The use of stock turnover rates to measure performance, demands, homogeneous categories of supplies, which will be provided when the Federal Supply Classification System is in common use by all services.

The potential usefulness of turnover rates is large. Higher turnover rates mean lower average inventories with a consequent reduction in the costs of storing and maintaining the inventory. If, *for example*, a certain class of stock shows total issues of \$60 million for the year and a turnover rate of two, the average inven-

tory would then be \$30 million. If the cost to store is 10% of the average inventory, it would amount to \$3 million. If the turnover rate can be increased to three, the investment in inventory will be reduced to \$20 million and the cost to store will decrease by one third, to \$2 million.

On the other hand, excessively high turnover rates mean frequent exhaustion of stock with consequent backorders, extracts and procurements. Analysis similar to that employed for economical order quantities must be used to determine the best rate of turnover and to fix operating levels for each class of items. To set these standards, considerable experience and continuous analysis is required. Little turnover rate history is at present available to the Army, and commercial experience is not wholly applicable. Financial inventory accounting data, adequate commodity classifications, and accumulation of long-term demand history will progressively fill this need.

When the goal of adequate turnover standards is achieved, the Army will be able to approach the "model stock plan" of inventory management, under which attention is concentrated on active stocks comprising the largest portion of total demand, excesses are prevented or quickly identified and disposed of, and inactive or insurance-type items are relegated to an appropriate position in the overall management of the system. Since studies have indicated that as much as 85% of supply activity deals with only 15% of the items in the system, an objective stock plan of this kind offers the Army very real opportunities for improvement in supply management.

f. Analysis of Demand Experience.

- (1) *Introduction.* The computation of levels, while it requires the use of experience and judgment, is perhaps the lesser part of the management job of planning to meet future demands. The questions still remain: How many units constitute two or six months' supply of this item? How many units will constitute two or six months' supply eight months or a year from now? There is no more important problem in the operation of the supply system. The analysis of past demand data and

their projection into the future cannot be reduced to an exact science. With awareness of such limitations, the following paragraphs sketch the sources from which information on demand is obtained, and the major problems in interpreting this information.

- (2) *Recurring and nonrecurring issues.* Throughout the supply system, an effort is made to distinguish those issues which constitute regular or recurring demand from those issues which are made for a special purpose and are not likely to recur in the future. Only the regular or recurring demands are considered in setting operating and requirements levels; it is assumed that nonrecurring, special purpose demands, will be dependent on specific programs and projects, to be added to regular requirements at the direction of planning authorities. Stations are required to show in appropriate columns of the stock record card whether issues are "initial" (nonrecurring) or "replacement" (recurring). Stations are not permitted to include the nonrecurring issues in the computation of levels to prevent inflation of their stocks. Issues in oversea commands are similarly recorded as initial or replacement at the depot or station where the issue was actually made. The depots code EAM cards for each shipped line item as either recurring or nonrecurring according to the basis of the requisition. These recurring and nonrecurring issue cards accumulated over several months are sorted by stock number and class of requisitioner, that is, active Army, National Guard, reserve components, etc., and listed as "Issue Analysis Report" for the stock control point. The inventory control points collect and maintain all the relevant information on an item, including the issue history, on a single record form for review by the stock analyst. The form of these records varies among the technical services.
- (3) *Distinguishing recurring from non-*

recurring issues. If the quantity of an item actually consumed in normal support of operations, or replaced due to fair wear and tear, combat losses or other attrition, is to be determined, it is essential that the quantity of the item issued for an abnormal or one-time use be distinguished in the computation of requirements.

The basic difficulty in distinguishing between these two types of demand stems from the fact that the depots do not normally issue to the ultimate consumer, but to station supply officers or oversea depots which are also nonconsumers. It is only in instances where the requisitioner on the depot system specifies that the stock being requisitioned is for some special, nonrecurring demand that it is possible to identify positively that the issue is nonrecurring. When the issue is in effect a bulk transfer of stock from the CONUS depot to the station or oversea stockroom, it is not possible to forecast accurately whether the stock will ultimately be issued to meet a recurring or nonrecurring demand. A solution to the foregoing problem insofar as it concerns bulk transfers of stock from CONUS depots to oversea depots may be to treat such transactions as interdepot transfers.

Recurring seasonal demands may be confused with onetime demands. It is noted that consecutive averaging of quarterly demand rates is not satisfactory for forecasting requirements for seasonally issued items or other items with sporadically recurring demand which conform to a definite pattern. Maintenance of levels during the "off season" in quantities sufficient to support issues during the "on season" is neither economical nor desirable. Requirements computations should therefore reflect the pattern of the seasonal or other sporadic demand, and procurement phased accordingly. To accomplish this, the period on which the average is based should be extended

to cover several complete seasonal or sporadic cycles so that average quarterly demand for the "off quarters" and the average quarterly demand for the "on quarters" can be determined separately. Average quarterly demand must also be adjusted to take into consideration increases in equipment population during the period for which the forecast is made.

Initial issues, "pipeline level" increases, and depot rebuild schedules are the most common source of nonrecurring requirements. They normally result from programs or plans made in advance of the actual demand; *for example*, an increase in troop strength or end item density. Such an increase would cause initial issues, which normally cause increases in recurring issues, which in turn will cause an increase in "pipeline levels," a chain reaction ending in a nonrecurring demand. A program to rebuild a large number of end items during a given period in the future will create a nonrecurring demand for parts over and above usual recurring field maintenance requirements. If the requirements analyst is made aware of future programs, he can add such demands to his forecast and adjust his supply action accordingly.

These considerations suggest that the separation of recurring from nonrecurring demands should be made only at the level in the supply system where supplies are issued to the ultimate consumer. However, the lag between the issue from the CONUS depot and the final issue to the consumer by the station or oversea installation, plus the fact that there are some 100 depots and several thousand station and oversea supply rooms, from which reports would have to be gathered, indicate that gathering reports from below the CONUS depot level would be extremely costly and involve an appreciable delay.

The basic stock record cards of the stations are the only accurate source of the

breakdown between recurring and non-recurring demand in the supply system, except, of course, special requisitions submitted by stations to the depots for the satisfaction of the demand of an ultimate consumer rather than for station stock. Although all of the station stock on hand may have been ordered for normal recurring demands, initial activations of troop units, class IV projects and other nonrecurring demands may be satisfied locally from that same stock ordered for recurring demands.

For purposes of financial accounting for inventories, the Army has instituted procedures which require the requisitioner at the station to indicate on his requisition the quantity of the item he has issued to meet recurring or nonrecurring demands since his last requisition for the same item. If the requisitioner at the station orders more or less than the quantity consumed between requisitions, or anticipates a different breakdown between recurring and non-recurring demands than that experienced during the prior period, he may adjust the quantities either in proportion to previous experience or to conform to the proportion that he anticipates.

When the requisition from the station arrives at the depot, the breakdown indicated by the station between recurring and nonrecurring demands permits the depot to make an immediate separation of the two classes of issues and overcomes any delay that would be incident to reporting after the actual issue at the station. However, it is recognized as a statistical solution to an accounting problem and is subject to certain inaccuracies which are difficult to eliminate completely. *For example*, if the requisitioner does not indicate that any proportion of the total quantity requisitioned will be issued to meet recurring demands, it must be assumed that the total quantity should be classified as a nonrecurring demand. Errors

of omission can therefore inflate the nonrecurring demand experience. It goes without saying that the requisitioner must compensate on his next requisition for any errors in judgment in prior estimates, or the picture reflected at the depot may become seriously out of focus.

In summary, although this solution carries in it certain recognized possibilities of error, it should prove reasonably adequate with frequent inspections of station practices and policing of the procedures.

Even with a good system, errors of recording and interpretation may continue to distort the relationship between recurring and nonrecurring issues. It is the rule rather than the exception for a stock analyst to be confronted with a history of "*recurring*" issues similar to the following:

Issues					
Jan	Feb	Mar	Apr	May	June
125	91	104	118	179	83
July	Aug	Sep	Oct	Nov	Dec
122	92	88	203	122	126

The general trend of issue history indicates a demand of approximately 105 per month. The months of May and October, however, are notable exceptions, with issues of nearly twice the average of the other months. Were these special demands incorrectly reported, or did they represent a concentration of replenishment demands, caused by seasonal factors, maintenance scheduling, or some other circumstances? If these months are averaged into recurring issues, the difference is considerable (120 average per month as against 105). It is always time consuming and often impossible to track down these issues to their ultimate source, destination, and justification. The practice of most stock analysts is to take all known factors into account and arrive at an educated guess on average demand, somewhere between the maximum and minimum figures. Since it is common for one stock analyst to handle several thousand items, and since rotation of personnel in some services often means that the same analyst will not review the same stock twice in succession, the knowledge and experience which are necessary for effective judgment are frequently lacking. It is in the field of interpreting issue experience that the need for a "commodity analyst" ceases to be a desirable management concept

and becomes a necessity. The commodity analyst should handle a restricted and related group of items and should build up continuous experience with the behavior of these items through the supply system from procurement to the ultimate consumer.

A corollary to the concept of commodity analysis is the extension of historical issue experience. The twelve months' issue history now prescribed is a bare minimum. Many stocks show a seasonal demand, and a much larger number which are not classified as seasonal stocks will show fluctuations in demand with seasonal activities. In these cases one year's experience will not indicate whether the seasonal activity was normal or abnormal, and two or three years' issue experience may be no more than adequate. Since the program for the entire Army is apt to change radically from year to year, extensive issue histories should be correlated with broad program changes in order to provide a stable basis for comparison. If longer issue experience is collected, it may be possible to treat certain nonrecurring issues as if they were recurring. Even emergencies tend to recur, and "unforeseen demands" from the short-run point of view will become stabilized over a longer cycle.

- (4) *Timelag in status reporting.* The same difficulties are encountered in obtaining current information on national assets and issue history as in recording current availability to meet immediate demand, as discussed earlier in chapter 3. In fact, the lapse of time between the cutoff date of the depot and the appearance of the information on a consolidated record at the inventory control point may be even longer than the interval required to transmit availability records to the stock control point. The stock analyst is working with information which may be as much as two months old at the time of his review. It is for this reason that he must reduce his assets by an amount equal to the estimated issues for the period of the lag, which is equivalent

to increasing the requirement by that amount. Furthermore, the issues during the period of the lag can only be estimated on the same basis as projected issues. If a change in demand has intervened during this period, the analyst is not only wrong in his estimate of present assets but is projecting future demands on an obsolete basis.

g. Distortion of Issue History by Substitutions and Extracts. Demand history, at the depots, stations and in oversea commands, is often distorted by issues of substitute items. *For example*, a screwdriver eight inches long is requisitioned. Since this is out of stock, a substitute screwdriver six inches long is issued. The demand for six-inch screwdrivers is inflated and the true demand for eight-inch screwdrivers understated. Extracts cause a similar distortion. When Depot X receives a demand for an item which is out of stock, the requisition is extracted to Depot Y. The demand at Depot X is understated and the demand at Depot Y is overstated. Although these distortions are partially compensated for by coding the EAM cards representing issues, neither substitutions nor extracts, particularly the latter, are completely or clearly unscrambled in reports of issue history. The difficulty lies in the fact that "issues" are accounting transactions whereas "demands" are statistical data. Where the demand did not result in an issue, the quantity requested cannot be combined with the quantity actually issued without destroying the accounting records. The conflict has been recognized by DCSLOG and the technical services, and the recently developed Army Field Stock Control System will result in the generation of pure demand experience data.

h. Issue Experience and True Consumption. Even the most accurate records of issues from the supply system can only be a partial reflection of the true demand, or the actual consumption of the item by the user. The depots record only what they have shipped. Many of these supplies, however, may have piled up in excess inventories at the station or repair shop in the continental United States, or in the oversea depot dump or maintenance shop, or in the hands of troop units throughout the world. Station stocks are periodically checked by depot liaison

teams, but for preventing excessive stocks in field activities, the stock manager must depend upon the regular Army-wide system of inspection which checks inventories at all levels to keep them in line with demand. Even though inspection may result in reduction of stock on hand at a station or oversea installation and the return of the excess to the nearest depot, the inflated issue experience has already been recorded and often has continued to be used as a basis for projection. It is necessary therefore to make continual adjustments to issue experience by study and analysis of stock receipts from returns and to study excess reports, which may reflect disposal of some of the stock previously issued. Since a considerable length of time may elapse between the original issue and the return or the declaration as excess, it is again necessary to extend issue histories over as long a period as possible.

i. Projecting National Demand Experience.

(1) Adjusting levels to changing demand.

Once the stock analyst has obtained the best approximation of past demand experience, he must use this experience as a basis on which to project future demand and must adjust his levels and orders accordingly. Where demand is changing, as it usually is, the problem of projection is a critical one. Where procurement lead time is six months or more, any change in demand may cause serious over or undersupply before it can be corrected. The analyst should be able to detect the *trend* in demand as quickly as possible if this imbalance of stock is to be minimized. This is a much harder process than mathematical computation of *average* past issues and projection of this average into the future. While averages must often be computed, as seen above, to analyze past issues and to obtain an approximate picture of recurring demand, injudicious application of these results to the future may compound and prolong the inevitable difficulties of adjusting supply to changing demand. If the analyst simply computes and projects the average past issues for the prescribed period, he will not reach his

new proper level of stock on hand for eighteen months. In experience, both averages and trends are hard to see when issues are fluctuating from month to month and initial demands are confused with replacements. The analyst's experience with the stock, and his knowledge of program changes and other data should be actively employed to interpret issue figures and to compensate for demand changes as soon as procurement lead time will permit. If the stock has a relatively high dollar value, it may be worthwhile to terminate contracts or cut back or stretch out deliveries in order to avoid the carrying of excessive stocks in the system over a long period of time.

If demand increases, the reverse is true and stock may run out. It must be noted, however, that the safeguards and incentives in the Army supply system, including the stockage objective, the reorder point, and the scheduling of procurement, are all weighted against running out of stock rather than against maintaining excessive stocks. The interpretation of demand by trends rather than averages becomes particularly important if longer issue histories are used at review.

(2) Additional factors influencing future demand. In estimating total future demand, the analyst must consider, in addition to issue experience, other elements of planning and past data which affect the supply situation. These include:

- (a) Scheduled changes.* Scheduled changes in troop strength, or in other major programs which will affect demand.
- (b) Equipment population.* The issue of repair parts, accessories, and attachments for major items of equipment, and the issue of components for sets, kits, and outfits, is governed by the number of these items of equipment or sets in use. Any change in the program for major equipment should be reflected in the distribution of

minor secondary items and repair parts. Of course, these problems are magnified where the same repair part is used in several pieces of equipment in varying quantities. The purpose of the Army Unit Supply Status Reporting System described in section D of chapter 3 is to supply information on major equipment population and to assist in determining repair parts demand.

(c) *Seasonal demand.* This affects de-

mand on many items, such as summer and winter clothing, stocks used at summer encampments and construction equipment which receives greater use in warm weather. These stocks should be procured in time to meet seasonal activity, even though turnover rates are low or nonexistent at the time of review. Analysts should be particularly careful not to interpret seasonal variations in demand as long-term trends.

CHAPTER 5

CONTRIBUTION OF PROCUREMENT TO SUPPLY MANAGEMENT

A. PROCUREMENT AND SUPPLY MANAGEMENT

1. General

It is the purpose of this chapter to review the major aspects of the coordination which is necessary between procurement and the other supply activities, and to evaluate the important contribution that can be made to effective supply management by efficient procurement. The selection and evaluation of sources of supply, the choice of contracting methods and contract forms, the analysis of the contractors costs, and the negotiation of contract prices and terms, must all receive close management attention.

2. Dynamic Inventory Control

The procurement agencies of the Army, from the local post, camp or station purchasing offices to the major central procurement activities, are the points of immediate contact between the demand generated by the troops and their activities and the national resources and facilities which are available to meet this demand. In such a position these agencies play a vitally important part in the overall management of supply. The Under Secretary of the Army in stating the major objectives of Army supply management in 1954, said:

"My earnest belief is that the importance of the establishment of dynamic inventory control transcends all other problems of the peacetime operation of a sizable Army under conditions of semimobilization readiness. I recommend that the establishment of an effective inventory control activity receive the highest priority during the new calendar year.

"Reduced to its fundamentals, inventory control has two principal objectives:

"1. Establishment of sound inventory objectives and resulting 'open-to-buy' limitations covering a floating period several months into the future.

"2. The dynamic means of consistently ac-

complishing programmed objectives through the hour-to-hour control of the 'input' into the supply system."

The first of the two objectives set forth by the Under Secretary has already been discussed in previous chapters. The second, the immediate and continuous control of input into the system, is fundamental to the execution of any supply management plan and cannot be achieved without the aggressive cooperation of all procurement activities. The basic need for responsiveness on the part of procurement activities to supply and stock control problems has been noted in the discussion on the storage, distribution and control of stocks. It should not be concluded, however, that procurement occupies only a subsidiary position in the overall picture of supply management. The point of view is often expressed that the responsibility of a purchasing activity begins only with the receipt of a procurement directive and consists in essence of obtaining a fair and reasonable price for stated quantities of specified goods on a stated delivery schedule. This is only partially true. A dynamic inventory control program demands much closer coordination of procurement and inventory control functions than can be achieved through a procurement directive and involves the active participation of procurement information, experience and judgment in the formulation of supply policy and decisions.

3. Procurement Pricing

Since a large part of all funds appropriated to the Army is spent for procurement of supplies or services, the close control of prices paid for the supplies or services is vitally important to overall financial management. In the civilian economy competition between products and companies in a relatively free market operates to determine prices, to reward the efficient pro-

ducer and to penalize the inefficient. When the Army buys commercial goods, it is essential that procurement maintain these competitive conditions. On the basis of dollar value, however, most of the goods bought by the Army are non-commercial, ranging from adaptations of commercial items to supplies for which no conceivable market exists outside the military. In procurement of such noncommercial items, it is again essential to substitute valid incentives to efficiency and lower cost manufacture for the pressures of competition which are partially or wholly lacking in the production of these commodities. The cost analysis and the pricing terms used in negotiated contracts, including the various repricing or redetermination provisions, incentive provisions and cost reimbursement provisions are all designed to cope with different aspects of this problem. Continuing examination and analysis is still needed in this area of procurement. A fixed price contract would always be used if it were always possible to establish final prices during negotiations which were fair to both the Army and the contractor. A fixed price contract is the easiest to administer and offers the contractor the greatest incentive to reduce his cost and conserve labor and material. However, in a dynamic economy such as ours where prices and conditions are constantly changing, it is often impossible to determine fair prices initially for all items procured by the Army. Under a fixed price contract the contractor assumes all the risk of performing the contract at a price agreed to in advance. Where time for performance of the contract extends over a long period of time or where the contract involves the first large quantity production of a new item the contractor must include contingency allowances in his price. Under such a situation, if a fixed price contract with contingencies is negotiated, the Government will

have to allow contingencies in cost. By the use of a price redetermination or incentive type clause and the Government's assumption of the risks involved, a contractor can be induced to eliminate cost of contingencies from his proposal. The redetermination or incentive type clause affords protection against incorrect estimates.

The redetermination or incentive type clauses are used only when (1) the accuracy of the contractor's estimate is questionable because of lack of cost experience or the possible occurrence of significant contingencies, (2) the possible savings which might result from a price adjustment offset the administrative cost of redetermination, and (3) the contractor's accounting system is sufficient to provide the cost information required to negotiate a fair price at the time of redetermination.

The contract negotiator is charged with the responsibility of selecting the type of contract best suited for the individual procurement. His choice will have an important effect on the ultimate cost to the Army. Emphasis is being placed on wider use of incentive type contracts in the Army. The incentive type contract gives the contractor a greater incentive to keep his costs down by allowing the contractor to share in the savings. A combination of incentive profit provisions with advanced techniques of cost analysis and projection may provide a more effective solution. Any solution will require constant refinement of broad procurement principles and techniques, in line with the recommendation of the Army Procurement Panel that:

"A change in philosophy is required whereby the efficient accomplishment of procurement and production is the goal rather than perfect textbook-type procurement and production."

B. METHODS OF PROCUREMENT

1. General

Detailed procedures for performing the purchasing function have been published in considerable volume. Many legal and administrative restrictions growing out of these procedures confront the contracting officer. It is not the purpose of this section to enumerate, review or

condense the purchasing details contained in such publications as Armed Services Procurement Regulation (ASPR); Army Procurement Procedure (APP); or any of the technical service SOP's for Procurement. Rather, this section seeks to differentiate between formally advertised procurement and negotiated procurement and to highlight the effect that each

method can have on the supply system and on the national economy.

2. Procurement by Formal Advertising

Formal advertising has been the "law of the land" and the preference of Congress for nearly 100 years. Its proponents claim that its advantages are wider competition, lower prices, and fairer treatment of contractors. These characteristics serve to illustrate the responsibilities of the sovereign state to the electorate and to the industrial society. Under a system of free enterprise, maximum competition must be encouraged. This competition should result in better products, better service, and lower costs. Although formal advertising is little used in business, because of the additional administrative cost and the general prevalence of commercial reciprocity resulting from "trade relations," leaders in industry nevertheless expect the Government habitually to use the impersonal formality of advertised procurement. For purposes of comparison with negotiated procurement, the mechanics of formal advertising proceed substantially as follows:

a. Bids are solicited by invitation and public announcement. The Invitation for Bid includes the identification of the item with appropriate specifications cited and with the delivery schedule which must be met. Invitations are sent to those prospective bidders whose names are on the Bidders' Mailing List for the item desired. A copy of the invitation is displayed in a public place such as the local post office or reception room of the contracting office. An announcement may be placed in the trade journals or newspapers likely to be read by other prospective bidders. Information is furnished to the Department of Commerce for inclusion in their publication, "Synopsis of U. S. Government Proposed Procurement." In short, the widest possible competition is encouraged.

b. Bids are submitted by those potential suppliers who are desirous of furnishing the goods or services the Government proposes to buy. Bidders must meet certain administrative requirements as to form and time of submission. The bid must be responsive to the invitation, to the extent that no exceptions are taken to the qualitative or quantitative requirements or to the delivery requirements.

c. Bids are opened in public at a preannounced time.

d. Bids are recorded on a "spread sheet" or abstract by entering the names of the bidders and the prices bid. This record is available for public inspection.

e. Bids are evaluated as to price, the bidder's financial and technical capability, skill and experience; foreseeable costs and delays in connection with inspection and shipping; and other factors. Preaward surveys may be required.

f. Award is made, by written notice, to that responsible bidder whose bid, responsive to the invitation, will be most advantageous to the Government, price and other factors considered.

Thus it is seen that formal advertising is a procedure carefully circumscribed by statute and regulation and relatively inflexible. It enjoys wide usage in the construction industry, for example, due to a generally universal understanding of construction working drawings and building material specifications, reasonably thorough preliminary design, and fairly generous lead times. However, many conditions arise in military procurement which demand greater speed in purchasing, tighter security, more design flexibility, specific makes or models, and intentional development of additional producers. These demands often cannot be met satisfactorily within the framework of formal advertising. Purchasing without advertising is referred to as "negotiation," and is described below.

3. Procurement by Negotiation

Negotiation might better be called "informal competitive bidding." This more descriptive term would tend to emphasize the concept that negotiation is an informal method of determining the best price available. Negotiation procedures are less formal than advertising procedures but nevertheless are required to be competitive whenever feasible and, when properly conducted, they result in fair and reasonable prices. In contrast to formal advertising, negotiation proceeds as follows:

a. Requests for proposals are sent to *selected suppliers*. If there is more than one source of the desired items or services, proposals are requested from enough potential suppliers to insure com-

petition. When such proposals may result in an award in excess of \$10,000, they will be promptly publicized in the Department of Commerce "Synopsis of U. S. Government Proposed Procurement, Sales and Contract Awards." The proposals, sometimes called "quotations," differ from bids in that they may be revised after submission. Additionally, when so specified, they contain cost breakdowns to show the quoters' estimates of labor, material, overhead, administrative, and tooling costs, and profit, whereas a bid is merely a price with no indication as to component costs.

b. The contracting officer may summon any or all quoters to negotiation conferences. One at a time, the potential producers are interviewed (1) to insure that they understand what is wanted, (2) to determine in greater detail what elements were included in cost estimates and how estimates were computed, (3) to discuss methods of manufacture, (4) to clarify drawings and specifications, and (5) to arbitrate any other point of possible misunderstanding so as to arrive at a "meeting of the minds." The Government negotiator sometimes is supported in such conferences by engineering personnel, cost analysts, legal advisors, and other specialists needed for a proper representation of the public interest. The manufacturers' representatives are given an opportunity to revise their quotations on the basis of a fuller understanding of the requirement. This revision may include increases in some elements of the cost estimate and cuts elsewhere. The aim of the Government negotiator should be to arrive at a fair and reasonable price, fair to the contractor and reasonable to the Government. It is of utmost importance to be able to conclude ultimately with an agreement with one of the quoters which will provide some incentive for him to reduce his manufacturing and overhead costs below estimated figures, thereby consuming less material and manpower and maximizing his own profits as a reward for good management. The type of contract negotiated can contribute to this incentive.

During negotiation, costs which seem inordinately high should be questioned and examined thoroughly to insure that they do not contain "fat." Costs which appear inordinately low should be examined just as thoroughly and in

the same searching manner, but for a different purpose. A hastily computed estimate which is manifestly on the low side can threaten the financial structure, even the existence of a business, thus also threatening timely delivery of needed items. The Government negotiator is just as interested in developing sound, reliable producers as he is in driving a bargain with the taxpayer's money. Hence, he must not attempt to drive quoted costs below a sound, realistic figure lest he leave the contractor with little or no incentive. Nor should the negotiation ever be allowed to become an auction, where each quoter knows every other quotation and revises his quotation on the basis of price-cutting instead of on the basis of intelligent cost analysis and honest cost reduction. Nor should the negotiation conference be allowed to degenerate into a haggling "I'll give so much—I'll take so much" session. Negotiation, therefore, requires a high order of business acumen and judgment on the part of Government representatives. It is in this type of procurement that the Government demonstrates to industry its ability or inability to conduct its purchasing in a business-like manner.

c. The successful quoter is selected after a review and evaluation of finally revised quotations. As with advertised procurement, award is made by written notice to that responsible quoter whose responsive quotation will be most advantageous to the Government, price, and other factors considered.

d. The final contract describing the agreements reached by negotiation may take one of several forms. In formal advertising, contracts are limited to fixed price types with occasional provisions for price escalation; whereas, in negotiated procurement, a wide variety of contract types are used. These are described in detail in ASPR and APP, and can be classified as being based on a fixed price or on cost. Many variations can be applied to these basic types and in general include:

- (1) Straight fixed price.
- (2) Fixed price with escalation.
- (3) Fixed price with redetermination.
- (4) Fixed price with incentive.
- (5) Cost.
- (6) Cost plus fixed fee.

- (7) Cost plus incentive fee.
- (8) Time and materials.

Thus, it is seen that procurement by negotiation is essentially informal, simple in procedure, but complex in execution. It must insure competition unless there is only one source of the supplies or services desired. In such cases, the

negotiators' examination of quoted costs must be sufficiently thorough to make up for the absence of competitive cost data. Negotiation is a necessary part of the purchasing structure and must not be allowed to fall into disrepute as a result of injudicious employment where formal advertising could yield equally satisfactory results.

C. SCHEDULING PROCUREMENT AND PRODUCTION TO MEET DEMANDS

1. Procurement Lead Time

a. Introduction. There is a direct relationship between the size of inventories on hand and on order that must be carried in the Army supply system and the length of procurement lead time. Chapter 3 has indicated that procurement lead time is a direct constituent of minor secondary item and repair parts requirements. For principal and major secondary items also a longer procurement lead time means that supplies must be ordered earlier and that more stocks will be on order at any given time. Furthermore, the requirements forecast is made for a stated period following the first delivery of the materiel ordered. The longer procurement lead time becomes, the more distant the future period over which requirements must be forecast and the greater the possibility of error. Efforts to reduce procurement lead time to a realistic minimum therefore will be directly reflected both in the money obligated by the Army and in the accuracy of requirements forecasts.

b. Administrative Lead Time. Administrative lead time comprises the period between the initiation of procurement action and the award of a contract. In general, administrative lead time on major items is taken up with the solicitation of bids or proposals, the negotiation or award of contracts and delays experienced in obtaining approval of programs and related funds.

Typically solicitation of bids and formal advertising procedures take longer than the more informal processes of negotiation. The two methods, however, are generally adapted to the procurement of different items. The substitution of negotiation for advertising in procuring the same item has been applied in emergencies to reduce backlogs of orders but tends to be an expensive change. Where competitive condi-

tions suitable to formal advertising exist, negotiation, especially if conducted in haste, may result in higher unit prices, thus nullifying the saving in time.

The time allowed for contract placement, whether by negotiation or advertising procedures, cannot be arbitrarily reduced. If contractors are not permitted sufficient time to prepare adequate bids or proposals or if contracting officers are not given enough time for considerations of bids or analysis of the proposals and negotiation with suppliers, poor procurement is likely to result. Reductions in contracting time, therefore, must be justified and defensible as good management practices. In some cases the negotiation of a definitive contract will be complex and will extend far beyond the established administrative lead time. Where requirements are urgent, it may be desirable or necessary to award a letter contract, which enables a contractor to begin production before a definitive contract is negotiated. A letter contract has long been recognized as having a proper place in defense procurement. This is true when the interests of national defense, particularly during periods of mobilization, demand that the contractor be given a binding agreement which authorizes immediate commencement in the performance of the contract and negotiation of a definitive contract in sufficient time to meet the procurement need is not possible.

ASPR outlines a number of restrictions on the use of a letter contract. Some of the limitations are that they: (a) shall be used only after a determination that no other type of contract is suitable, (b) shall not be entered into without competition when competition is practicable and (c) shall be superseded by a definitive contract prior to the expiration of 180 days from the date of the letter contract or 40% of completion,

whichever occurs first. The ASPR also specifies certain minimum provisions which must be included in the letter contract. It is the policy of the Army to include as many definitive contract provisions in the letter contract as possible.

Another method which may be used in appropriate circumstances to reduce administrative lead time is the informal solicitation of stepladder quotations on different quantities within the total amount to be procured, in advance of definite determination of quantities required and issuance of a procurement directive. This requires, in the first place, a close working relationship between supply and procurement activities in determining the timing of demand and the range of quantities for which proposals will be solicited. In the past, however, this method has sometimes resulted in advance hiring and other preparatory commitments by manufacturers in anticipation of contracts for which funds were not yet authorized and which in some cases were never placed. Advance solicitation, therefore, requires qualification and full explanation to contractors that no commitment is being made by the Government. It is adapted primarily to the procurement of commercial or semicommercial items for which the contractor does not have to make substantial changes in his workforce or production methods.

Even after definite requirements have been determined and funds obligated, the solicitation of stepladder quotations may assist in the closer correlation of demand with supply. As noted in chapter 3, administrative lead time at present is rarely less than three months in all services. This means that when the review cycle period for an item is three months or less, the requirements resulting from a subsequent review will often be determined before the procurement resulting from a prior review can be placed. Immediate communication of any change in requirements to the purchasing agency and result in modification of quantities on order before a contract is awarded. Any change at this point is, of course, far simpler and less costly than the processes of amendment or termination of contracts which will be discussed later in this section. If the contracting officer has solicited quotations on a stepladder basis, he is prepared to change the quantities to be ordered on relatively short notice.

c. Production Lead Time. Production lead time is the period from award of a contract until the acceptance of the first delivery of materiel into the supply system. It depends primarily on the nature of the item, the contractor's production methods and the state of the market. Since these factors are largely beyond the control of the Army, the most important procurement function in this area is to set a realistic production lead time at the outset and then ensure that this schedule is met by the contractor. The procurement agency is under pressure from two directions here; requirements analysts are often working from obsolete data on production lead time and request deliveries within too short a period. On the other hand, contractors faced with a tight delivery schedule in a request for proposal or invitation for bid will tend to bid or quote on schedules which they know they cannot meet in order to obtain the contract, if they expect that penalties for delinquency will not be rigidly enforced. The results of this situation can be serious. Not only does this mean exhaustion of supplies and emergency requisitions, but if requirements analysts are aware that deliveries are habitually behind schedule, they will tend to inflate their requirements in other ways in order to compensate for such delays.

In the review of procurement directives, the judgment and experience of procurement personnel should be fully applied in evaluating the realism of requested delivery schedules. If the schedule cannot be met under present procurement conditions, the requiring activity should be informed and a more realistic schedule determined before invitations for bid or requests for proposal are sent to manufacturers. After invitations or requests are distributed, it is difficult to withhold award from a low bidder or quoter who meets the requested delivery schedule, even through in the judgment of the contracting officer and in comparison with delivery schedules proposed by other bidders this schedule may be unrealistic.

Once a realistic delivery schedule is agreed upon contractually, it is the responsibility of contract administration personnel to make sure that it is met.

Long-run relays which may alter the standard procurement lead time for any item will affect

requirements computations as well as immediate supply status. If requirements are to be increased because of increased procurement lead time, it is doubly important that a delinquent contractor should not receive a bonus in the form of a larger follow-on contract, which was ultimately caused by his own delinquency.

2. Delivery, Scheduling, and Destinations

a. General. Production lead time ends with the first delivery of supplies. In most procurements this and subsequent deliveries must be phased out, as indicated in chapter 3, to maintain adequate but minimum levels of stocks in the system. Again, the purchasing agency stands between the interests of the supply system in maintaining minimum inventories on hand and the interests of the contractors in obtaining a delivery schedule suitable to their production load and their financial needs. Sometimes contractors will not maintain a constant flow of deliveries in amounts small enough to stay within the operating level. Their production may be seasonal, or the standard packaging unit may be larger than the amounts required. They may refuse to extend production over the period desired by the Army or they may do so only at a considerable increase in price. In all these cases, it may be necessary to accept supplies into the system in excess of operating levels. Where higher prices are involved, the interests of overall economy require that procurement premiums be balanced against the costs of storing larger inventories before a decision is made. Special permission must be obtained to accept stocks in excess of authorized levels.

b. Changing Destinations. Destinations to which supplies will be delivered are generally stated in the initial procurement directive and incorporated into the ensuing contract. This has an important effect on the selection of suppliers, since it is the contracting officer's task to select a source whose price, including shipment to the destinations cited, will be the lowest among the responsive bidders. The contracting officer may elect shipment at the contractor's expense or by Government bill of lading, whichever is cheaper.

Frequently, however, destinations must be altered before delivery is actually made. De-

mand fluctuates, and the depot or station to which shipment was originally directed may now be in an adequate or overstocked position. As noted in chapter 3, it is the responsibility of the inventory control point to reschedule deliveries in order to maintain so far as possible a balanced stock position at each storage point. In order to provide the inventory control point with data necessary for rescheduling, it is advisable for the purchasing agency to solicit bids and quotations initially both on an FOB plant and an FOB destination basis. In formally advertised procurements the Armed Services Procurement Regulation states that the invitation shall provide for bids on either or both these bases where carload or truckload lots are involved. Only with this price information can the inventory control point and the purchasing agency select the most economical course of action:

- (1) If the costs of transportation from the contractor's plant to the new destination are less than to the old destination, shipments must be diverted.
- (2) If the costs of transportation to the new destination are considerably greater than to the old, it may be desirable in some cases not to divert shipments but to meet demand at the new destination from a nearer source of supply. The cost of maintaining excess stocks at the old destination must also be taken into account. This alternative will be particularly applicable to stocks of high bulk and low dollar value.

c. Changing Scheduled Quantities. Not only are destinations changed to correspond to variations in local demand, but in many instances total quantities on order must also be changed after contracts are placed to reflect changes in total demand. This is a crucial point in the concept of dynamic inventory control: the regulation of input into the supply system to respond as immediately as possible to upward and downward fluctuations in demand. When demand increases, existing contracts may be modified to increase quantities or new contracts may be placed. Because an upward trend in demand, if correctly interpreted by the requirements analyst, will throw large initial orders on the

market until stocks are built up to the new levels, a procurement premium must sometimes be paid as low-cost producers become loaded with capacity orders. It is the task of the procurement agency to hold this premium to a minimum, and if necessary to go back to the requirements analyst and determine whether orders can be phased to avoid excessive concentration. Very often an acceleration of the review and order cycle will provide a more accurate control than more infrequent placement of larger orders. The economical order quantity analysis described in chapter 3 will assist in keeping requirements computations current with increasing demand.

When demand decreased, planned procurement may be canceled or modified as described above. Because decreases in demand also have a cumulative effect, however, it may be necessary to cancel or modify contracts already in existence, if any additional costs are less than the costs of carrying excessive stocks in the supply system. Here again, the procurement agency is responsible for analyzing and appraising the most economical course of action. There are three basic methods of reducing input into the supply system:

- (1) Contracts may be terminated completely for the convenience of the Government;
- (2) Contracts may be "cut back" or partially terminated for convenience of the Government. Individual deliveries may be eliminated or all deliveries proportionally reduced;
- (3) Delivery schedules may be stretched out so as to deliver the same amount over a longer period of time. Almost invariably the first alternative results in cost increases. Unless termination of a contract occurs before the contractor has performed any work or made any preparations, payment must usually be made for his set up costs, materials inventories, work in process and settlement expenses thereby in-

creasing considerably the price of any finished units. The second type of action, the cutback, has generally a less predictable effect on prices than complete termination. If a contractor has incurred large preparatory costs and has made advance commitments for materials, the price of the remaining units is increased. In some cases, however, the materials inventory is bought at short range or may be applicable to other production. Here, it is often possible to make a settlement at little or no increase in cost. Unlike complete or partial termination, stretching out deliveries depends upon the consent of the contractor to an amendment of the contract. If this is agreed upon, it may be possible to obtain the same or even lower prices for an extension of the delivery schedule. This depends on such factors as trends in the total volume of the contractor's business and the amount and pricing of subcontracts.

The procurement agency, therefore, is frequently in a position to determine the action which will result in the lowest overall cost to the supply system. Because of the expense and the administrative workload of termination under present regulations, most terminations of production contracts in the past have applied only to contracts of extremely high dollar value. If close control of inventories is to be attained, however, flexible methods of canceling, cutting back or stretching out quantities on order must be extended to the hundreds of thousands of items for which individual dollar demand is relatively moderate. Total inventories of these items amount to billions of dollars, and the costs of handling and storing them form a significant portion of the total operating costs of the supply system. In view of potential savings of this magnitude, the additional personnel and workload for procurement agencies in achieving a more flexible control of quantities on order might be well justified.

D. FLEXIBLE PROCUREMENT

1. Introduction

The basic features of open end and call contracts have been discussed in chapter 3. Their purpose is to make possible the delegation of supply responsibility for commercial-type items from central control to depots and stations, to reduce quantities of such items on hand and on order and to introduce a more flexible control of supply and demand. It is still necessary in many cases, to maintain central records of the quantities ordered so that demand data will not be lost. Problems relating to placement and followup will be discussed separately in this section for open end and for call contracts.

2. Open End Contracts

From the standpoint of inventory control, the open end contract provides the minimum quantities on order and the utmost flexibility in balancing supply against demand. This contract specifies no minimum or maximum quantities and no schedule or frequency of orders. It indicates only the period over which orders may be placed and the unit prices of items which may be ordered. Since the basic contract does not commit the Government to buy any specific quantity of supplies, the stocks are not placed "on order" until the order is actually sent to the manufacturer by the using activity. The "procurement lead time" for such a contract, therefore, consists only of the period between stock review by the using activity and receipt of supplies and may be as little as fifteen days. The "open-order file" is much smaller than for central fixed-quantity procurement, where the entire quantity for any period must be ordered in advance. The effect of error in forecasting is minimized and responsiveness to fluctuations in demand is greatly increased. In addition, if orders against open end contracts are placed by stations, stock levels are not maintained at depots. Total inventory and associated carrying and administrative costs are greatly reduced.

From the standpoint of procurement, however, the open end contract has certain limitations. Although it has been widely and successfully used in industry, its legal status as an enforceable contract is open to some question. In the simplest terms, if the Government does

not commit itself to buy anything from the contractor, it cannot legally compel the contractor to deliver anything to the Government. Many open end contracts in fact permit the contractor to accept or refuse the obligation to deliver within a certain period of time after individual orders are received. Because of the indefinite nature of open end contracts of this type, some suppliers will be reluctant to accept them or will charge a considerable premium in their prices.

3. Call Contracts

The call contract specifies a fixed total quantity to be delivered and a fixed schedule of calls upon the contractor. The quantity to be delivered at each call, however, is not specified but depends upon the amount needed for each period by the using activities. While less flexible than the open end contract, the call contract permits variations in deliveries according to variations in demand, and, if calls are placed by stations, eliminates stockage and handling at the depot. It may be used where contractors must set up production lines and schedule manufacture of an item but are willing and able to hold finished goods in storage until called for by the Army. Again premiums may have to be paid for this type of procurement, but frequently this may be less expensive than the storage and transshipment costs within the depot system. It may be noted again that the success of the technical service procurement agencies in placing open end and call contracts is an indication both of effective procurement operations and of the feasibility of these forms of contract. Many manufacturers, in fact, are coming to express a preference for open end or call contracts, since they often give the contractor an approximation of total requirements over a considerable period of time and avoid unexpected orders for large deliveries at short notice.

4. Variations on Open End and Call Contracts

Between the open end contract, which does not specify any quantities at all, and the call contract, which specifies a fixed total quantity and allows flexibility only in periodic deliveries, there is a wide range of variations in contract

provisions which may be employed to fit the circumstances of supply or procurement in any given case. The nomenclature assigned to such variations is not yet fixed; in any case the primary consideration, as for any contractual form, is not the name of the contract but its effectiveness. This comprises its legal sufficiency, its adequacy to protect the interests of the Government and its acceptability to the contractor.

One variation of the call contract is already in use. This variation provides for deliveries over a maximum period of six months with an option to increase the quantities and to extend the deliveries for another six months. The inventory control point must maintain records of the amounts called in for delivery under the contract, and if deliveries run ahead of estimates, the option may be picked up and the quantities increased. While such an option clause in a call contract will not meet immediate increases in demand during the original delivery period, it will provide a cushion against future demand increases in the event of a general upward trend.

Often it is difficult to estimate demand over the contract period, and as indicated above the contractor will not accept the indefinite commitments of an open end contract. In such a case a contract may be written providing for minimum total quantities to be delivered but no maximum, or for both minimum and maximum total quantities. These variations in total quantity may be combined with variations in individual or periodic deliveries, as under a call contract. Such an arrangement can protect the Government to a certain extent against over or undersupply and the contractor against vanishing or excessive demands.

Other variations of both open end and call provisions can be worked out to fit individual situations. All of them require the closest coordination between procurement and other supply activities to analyze the prices to be paid under each possible method of contracting, the degree of probable fluctuation in future requirements and the costs of transporting, handling and storing the items at various levels in the supply system. Only such an analysis can determine the most appropriate and economical method of procurement, ordering and control.

E. CONTRACT ADMINISTRATION

1. Introduction

The administration of a Government contract begins as soon as a copy reaches the contracting officer, contracting officer's representative, (COR), or other person designated to administer the contract. It is here that all previous actions relating to the purchasing function are tested. Administrative problems are minimized if contractual terms have been defined clearly and if the contractor is financially and technically capable of performance.

Effective contract administration seeks to assure that the contractor is performing in accordance with the terms of the contract, and that the obligations of the Government, as specified by the contract, are fulfilled. The responsibility for proper administration of Government contracts rests with the contracting officer acting through his designated agent. In the discharge of this responsibility, the contracting officer must rely upon accounting,

legal, inspection, and other technical personnel to provide assistance in insuring that the interests of the Government are fully protected.

2. Functions

The functions of contract administration include, but are not limited to: materials expediting; issuance of Government-furnished materials or property and disposal of any excess; financial assistance; inspection and acceptance; price redetermination; and negotiating contract modifications.

3. Quality Control and Procurement Inspection

a. Function. Of all the functions of contract administration, probably the most familiar but the least appreciated is quality control and procurement inspection. Regardless of the mutual respect and amicable relationship between the contractor and contracting officer, the Government must insure that items purchased, manufactured and delivered do, in fact, satisfy the

requirements set forth in contracts. The failure of an item to meet contract requirements and the subsequent failure to perform effectively in the field will produce a substantial loss of money, time and tactical effectiveness. Technical requirements of the contract set forth in specifications are the standard by which products are measured. Therefore, they must be exact and describe clearly what is wanted. Specifications are defined as follows:

"A clear and accurate description of the technical requirements for a material, a product, or service, including the procedure by which it will be determined that the requirements have been met."

Specifications are thus the basis for all quality control and procurement inspection.

b. Quality Control and Inspection Personnel. The heart of the quality control and inspection function is the people in it. Historically they have been technically-trained, dedicated, but usually underpaid employees. Their job is thankless because if it is performed too rigidly they antagonize the industry representatives with whom they must deal daily; and conversely, if they perform too loosely they will incur the wrath of the ultimate user. Too frequently, as a result of poorly prepared specifications or inadequate contract clauses, quality control and inspection personnel are called upon to exercise judgment and make decisions beyond the scope of their training and ability.

c. Philosophy. Quality control and procurement inspection standards do not automatically imply detailed measurement of every dimension of every piece manufactured for the Army. Basic Army policy on quality control and inspection requires that the procedures to be used in determining compliance with requirements shall be set forth in specifications. Quality Assurance Provisions set forth in specifications are limits on the maximum severity of the procedures that may be used by the Government. These provisions are intentionally flexible to permit the Government to perform only that amount of inspection deemed necessary.

To some this may appear to be a change in philosophy and to others it may appear to be dangerous. First, it is not a change in philoso-

phy in the sense of being new to industry. Mr. J. W. Bancker, as Vice President of Western Electric Company, at an American Society for Testing Materials Meeting in 1931 defined specifications to be:

"Material specifications are, in the main, simply definitions of the properties of the materials which the purchaser desires. They represent his best efforts to state in measurable terms those properties which are necessary for satisfactory use at the least cost consistent with the desired quality. In addition, they include methods of test and disposition of material in case of failure to meet requirements and serve to provide a basis of inspection mutually agreed upon between the supplier and the purchaser, and therefore, they provide a basis for obtaining comparable competitive bids."

Second, this philosophy which sets a limit on Government inspection cannot be considered dangerous in the light of a Comptroller General's decision which states in part:

"A substantial majority of the cases upon the subject have agreed in holding that an acceptance by the buyer of one or more shipments of goods defective in quality does not, in the absence of circumstances raising an estoppel, amount to a waiver of the defect as to the entire contract, precluding the buyer from rejecting subsequent shipments similarly defective. It is implicit in most of the cases so holding, however, that such an acceptance may preclude the rejection of subsequent shipments of the same quality where the circumstances lead the seller to reasonably believe that goods of the kind delivered will be accepted in the future, and he changes his position to his disadvantage in reliance on such belief."

Inspection by Army personnel of each operation in every plant, and 100% inspection of every article produced, is not only impossible but is an unnecessary duplication of the efforts of the contractor's inspection personnel. Con-

sequently, the Army insists that its contractors establish and maintain quality control systems which are acceptable to the Government. One of the important decisions to be made by contracting and inspection personnel is the determination of the extent to which the Government is willing to place reliance on a manufacturer's quality control system thereby reducing the amount of physical inspection to be done by Government personnel. Army policy for such reduced inspection is set forth in Army Regulations which state:

"Where there is satisfactory evidence of high quality of production which is the definite result of an effective quality control and inspection system, the amount of Government inspection will be adjusted to a minimum consistent with proper assurance that the supplies accepted conform to the quality requirements established by the procurement documents."

Quality control, as defined in the Army Dictionary of Terms, is "the complete system of assuring that the supplies accepted are in accordance with requirements, including inspection and test procedures, acceptance criteria, etc."

Inspection is but one of the methods by which quality is determined. Inspection, therefore, is one phase of the broader concept of quality control which includes not only the examination of finished articles for defects but also includes intelligent and aggressive action for the elimination of causes of defects. It has been said that quality cannot be inspected into a product. Inspection is only an after-the-fact measurement of manufacturing performance. Unless there is a feedback of the information gained from inspection, quality will continue at the existing level.

d. Inspection Interchange Agreements. Government departments and agencies are expected to coordinate their inspection activities within industrial firms and within specific plants to avoid duplication of effort and the extra burden on the manufacturer of having representatives of several different Government agencies in his plant. The use of inspection interchange agreements lengthens the line of communications between the inspector and the contracting officer

and once again emphasizes the need for good specifications and accurate contract clauses. Substantial economies have already resulted from the interchange of inspection services and it is anticipated from past experiences in this field that substantial savings will continue in the future.

e. Economic Considerations. Finally, the underlying theme of all efforts to control quality and the economic rule which determines the amount we are willing to pay for inspection is: The *cost* of quality must be weighed against the *value* of quality. When a manufacturing process is producing a certain percentage of defectives in every lot of production, it costs money to reduce that percentage of defectives. As the percentage of defectives approaches zero, the cost of approaching zero goes higher and higher. There is a point beyond which it is no longer economical to reduce the percent defectives. This is the theory of Acceptable Quality Levels (AQL). It is normal to receive a certain percent of defectives in every lot of production, because it may be cheaper to make repairs or replacements in the field to that small percentage than to incur additional costs in the inspection and quality control system to insure that those defects do not occur. An exception to the normal may be found in the case of parachutes, lifesaving equipment, and other items of comparably critical nature. As used in quality control and acceptance inspection programs, the word "defective" is used generally to denote items failing to meet specification requirements such as tolerances, color, etc. In this sense the term "defective" does not necessarily mean that the item will not function. This concept, the cost of quality versus the value of quality, is the underlying management principle associated with inspection in all its forms and should be the basis on which inspection policies are determined.

4. Coordination with Purchasing

Followup of contract performance, preferably by personal visits, can do much to make contractors aware of their responsibilities. If a contractor receives no communications or queries concerning his performance, he is likely to underestimate the seriousness of being delinquent. One of the principal methods available to the Govern-

ment in enforcing timely performance is the ability to withhold further contracts from a supplier who is delinquent and has no valid excuses for his delay. Because the functions of purchasing and contract administration are often separated, information on delinquency is not always made available to purchasing personnel, and penalties for delinquency are not always strictly enforced. In some cases suppliers have been awarded a considerable number of successive contracts for the same item although they were delinquent on each one of them. The contract administrator has an impossible task in trying to enforce any delivery scheduled when the contractor knows that his delinquency is no bar to future business with the Government.

F. GOVERNMENT ASSISTANCE TO CONTRACTORS

1. General

In the procurement of military materiel, many conditions arise which complicate the relationships between the Government and its suppliers. The nature and complexity of some military items, the controlled use of raw materials, the extraordinary quantities sometimes required, and military urgency, all contribute to an unusual buyer-seller relationship between contractor and contracting officer. These same factors require the Government to extend various forms of assistance to its contractors who are asked to perform unusual feats of production and delivery which are above and beyond their normal activities. Government assistance can take many forms such as providing technical assistance, furnishing components, materials or machine tools from Government stocks, providing tax relief through accelerated tax amortization of plant and equipment, expediting the availability of controlled critical materials, providing for tests at Government laboratories, and providing financial assistance.

2. Government Furnished Property

a. Whenever absolute uniformity in an end product is desired, the Government may elect to furnish from its own stocks or from a single source the necessary components or materials to insure physical or functional consistency in the end item. A good example of this is the manufacture of uniforms. Also, in the purchase of

Whether delays in contract performance results from delinquency or from valid causes, they should be detected as early as possible, realistically appraised and communicated to purchasing and supply activities. Short-run delays which are due to peculiar problems of the contract or the supplier will, of course, cause immediate changes in supply status. Dues in and back-orders against dues in must be altered, and in some cases requisitions must be canceled or substitute items found. Contractors generally tend to underestimate prospective delays, and a skeptical and realistic appraisal of future performance is necessary on the part of contract administrators if multiple delays and changes in supply status are to be avoided.

truck-mounted equipment, such as crane-shovels, air compressors, and similar items, it is usually desirable to have some standard Ordnance chassis for the various superstructures. In such cases, Ordnance chassis are shipped to equipment manufacturers as Government-furnished property (GFP). Similarly, when the Government has absorbed all of the production of a particular industry for an item or class of items, it must accept the responsibility of parceling out those items to all who require them. In the manufacture of certain highly complex military items, the Government may have difficulty locating a responsible supplier. In such cases, the Government may have to relieve the pressure on the contractor's limited working capital and furnish materials from stock or from a separate contract with another producer. Probably one of the most common forms of GFP is handled by special tooling clauses in supply contracts. These clauses provide for contractor acquisition of dies, jigs, and fixtures to be used, and probably consumed, in the course of a particular contract for a particular item. Although the contractor actually purchases or fabricates the special tooling, it is paid for by the Government as a separate item in the contract and the Government reserves the right to take title and direct the disposition of the residue when the contract is completed. Additionally, Government-owned machine tools are available on lease agreement from the Army Industrial Equipment Reserve.

b. All of the foregoing examples of Government-furnished property demonstrate a form of "bailment," to use a legal term. As custodians of someone else's property, in this case the Government's, contractors receiving GFP are obliged to exercise certain safeguards and perform certain accounting so that the contracting officer, the Government's representative, may know the status and employment of the Government property which is in the hands of the contractor. It is indeed difficult for a contracting officer to insure that optimum use is being made of all Government-furnished materials, components and tooling in the hands of contractors in so many different places. The regulations concerning these matters are contained in appendix B to the Armed Services Procurement Regulation; and one of the most difficult elements in contract administration is to insure compliance with these regulations.

3. Expediting Assistance

a. In some quarters, the word "expediting" carries an unfavorable connotation. To some it implies pressure to do more than a normal day's work, requests for faster-than-normal methods of delivery, and similar hurry-up measures. In the broader sense, however, expediting can be thought of as assisting the contractor in tying loose ends together, and assuring that each of the contributors to a project has the technical know-how and knows the scope and magnitude of his responsibilities. Probably the greatest service that a contracting officer or a contracting officer's representative can perform, as a matter of expediting, is in the field of critical materials. During times of emergency, Defense Order (DO) Ratings are required in order to obtain certain types of steel and other critical materials. "The Business and Defense Services Administration (BDSA)" has continued a priorities system generally called the "D. O. Rating System." Under this system rating and allotment numbers are used to identify, and given preference to contracts and orders for defense contracts. When the regular procedures of the Defense Materials System and the rating system will not obtain materials in time for Department of Defense Programs, the contractor may apply for special assistance from BDSA through the contracting officer. It is also possible to divert materials

from one program to another based on relative urgency of their production or rearrange production schedules to meet the urgent needs of essential items. To the extent, therefore, that expediting harasses a contractor by throwing his production schedules out of kilter, it is not really assistance; however, to the extent that expediting can be beneficial in helping the contractor meet his delivery schedule, it then qualifies as true assistance. Contractors resent Government "meddling" in matters which they have demonstrated their ability to handle by themselves.

4. Financial Assistance

It is in the realm of financial assistance that the Government can act to improve the working capital position of a contractor and thus enable him to produce faster and more efficiently, where without help, he may be unable to fulfill his contractual obligations. Assisting a contractor with his working capital needs is referred to as "Defense Contract Financing." This usually takes the form of a private bank loan, a guaranteed loan, progress payments, or advance payments. Department of Defense policy states a preference for these forms of Defense Contract Financing in the order named.

a. *Private Financing.* Although private financing may be accomplished by various means, "assignment of claims" under a Government contract is extensively used as a method of private financing. This method of financing benefits the Government by keeping it out of the banking business. Once the assignment is made, the bank has the task of administering the financing. Another desirable feature of this type of financing is that it quickly establishes the contractor's credit at a bank, so that he does not have to wait for his money. No time is consumed in lengthy investigation by Government agencies before the loan is approved. The bank to whom the assignment is made receives all payments directly from the Government. The contracting officer can be of assistance in a contractor's negotiations with his bank by certifying the existence and nature of the Government contract and by expressing the urgency which is attached to the procurement in question.

b. *Guaranteed Loans.* The guaranteed loan, popularly called the "V" loan, is made by a bank to a Government contractor and is guaranteed

up to a certain percentage by the Government. Current policy does not encourage guarantees of more than 90% of the amount loaned except in very unusual circumstances. In this type of loan the Government shares the risk with the bank by underwriting a certain percentage of the loan and also shares the interest paid by the contractor. By sharing the risk, the Government also sustains its share of losses incurred in case the contractor defaults. This involves the use of Government funds and so justifies the Department of Defense preference for private financing. The records indicate an extraordinarily small number of defaults in the V-loan program due primarily to careful screening of applications by the technical services, the Comptroller of the Army, and the Federal Reserve Board.

c. Progress Payments. Progress payments are payments made to a contractor as work progresses under a contract. Progress payments, based on accumulated costs, are considered to be reasonable and necessary in certain procurements. Another type of progress payment is that made on construction contracts based on a percentage of completion of work under the contract. Progress payments are particularly applicable to contracts for the production of items having a long production lead time. In these cases the contractor is reimbursed for a percentage of the costs incurred before the actual delivery of any items from production. For short lead time items, *for example* those in production less than 30 days, progress payments in effect become partial payments, that is, payments for partial deliveries. Progress payments require careful administration to insure against overpayments. In all cases, physical progress of the work should be evaluated periodically to assure that the progress payments are fairly supported by the value of the work accomplished on the undelivered portion of the contract.

d. Advance Payments. Advance payments are payments made to the prime contractor by the Government in the form of advances prior to and in anticipation of performance under a contract. Advance payments may be authorized up to the full amount of the contract price. They differ from partial payments and progress payments which are made as a result of the completion of specific portions of work under the contract. Advance payments differ from guaranteed loans and private financing in that advance payments are public funds, the money being put up entirely by the Government. Advance payments must be limited strictly to the needs of the contractor and closely related to his reimbursement cycle. The official Army policy on advance payments is that they be given only if no other method of contractor financing can be arranged.

5. Summary

Government assistance to contractors, therefore, whether it be in the form of money, materials, or management, is an integral part of the fabric of the buyer-seller relationship between the Government and its suppliers. Few problems exist where the Government is consuming a relatively small percentage of the total national production of a common commercial item. However, in securing production to meet the almost insatiable requirements of armies in the field, of complex items not used in the civilian economy, Government agencies responsible for supply and procurement must be prepared to extend any type of assistance necessary to insure timely production. Of course, there is no substitute for the development of a sound industrial economy made up of individual manufacturing plants which can support themselves and meet military needs, but the demands of military procurement do not always fit conveniently into civilian production patterns; hence, the need for Government assistance to private contractors.

G. FACILITIES CONTRACTS

1. General

As a general policy, the armed services prefer to do business with contractors who can furnish their own production equipment and facilities. However, production facilities may be provided by the Government when such action is considered necessary or desirable in the public inter-

est. In the case of contractor-owned facilities, a portion of the acquisition cost is amortized just like any other manufacturing costs; however, Government-furnished facilities become the property of the United States, and the contracting officer specifies their disposition upon completion of the contract.

2. Nature of Facilities

Facilities are the machine tools, real property, and sometimes furniture and vehicles, that are used to produce goods or services; they are usually of such nature that there is a residue, in varying stages of depreciation, at the end of a contract. Facilities do not include "special tooling,"—the dies, jigs, and fixtures, that are consumed in the production process and are generally usable by only one contractor and reliable only to his particular production method. Since facilities are not usually consumed on a single contract, it is appropriate that their total cost should not be considered part of the contractor's bid. Hence, the provision of facilities is usually handled as a separate agreement, not part of the supply contract.

3. Contract Provisions

a. Facilities contracts provide that title to all facilities furnished to the contractor by the Government shall remain with the Government, and that title to facilities acquired by a contractor for Government account, shall be vested in the Government at the earliest practicable time.

b. Facilities contracts allow the contractor to use the facilities only in connection with specific contracts.

c. Other provisions of facilities contracts require the contractor to perform the following services, without cost to the Government:

- (1) Maintain adequate property control records and a system of identification of all facilities.
- (2) Protect, preserve, maintain and repair the facilities in accordance with sound industrial practice.
- (3) Notify the contracting officer, within 30 days after any facility becomes lost, damaged, destroyed, no longer usable, or no longer needed for the performance of Government contracts.

4. Standby Provisions

A facilities contract may include provisions for maintenance or storage of the facilities, upon completion or termination. Facilities thus placed in layaway status are reported to the Chief of Ordnance who maintains the central inventory for all Army-owned production equipment.

H. INDUSTRIAL MOBILIZATION PLANNING

1. Introduction

Realistic war plans must include a careful consideration of the availability of adequate logistic support. In a world of steadily advancing technology, logistic support on a national scale becomes dependent upon the industrial potential of the country. Since this industrial potential is not geared in peacetime to satisfy the needs of war, it becomes necessary to make positive plans for converting the nation's industrial output from civilian goods to military goods. To accomplish this planning and to provide for an orderly conversion of the industrial complex from peace to war there has been developed an Industrial Mobilization Program. This program is based on the coordination of military needs and industry capability and is designed to locate the production capacity needed and to allocate that capacity for the manufacture of certain key items in time of emergency. The theme of the program is *time*. All elements of

the Industrial Mobilization Program are directed toward reducing the amount of time which it takes for any given industry or plant to convert from civilian production to military production. One obvious method of gaining time and speeding up the date of logistic readiness would be the acquisition during peacetime of sufficient mobilization reserve stocks to satisfy materiel needs until production could build up to meet mobilization requirements. The cost of this method would be staggering and probably prohibitive because of the threat it would make to national economic stability. In addition to tying up huge amounts of capital by purchasing mobilization reserve stocks, another disadvantage accrues. That is obsolescence. Modern tanks, guns and planes and other important implements of war undergo constant development and improvement. As new models are turned out, the old ones become less desirable and less effective and eventually must be relegated to the status of obsolescence. Of course,

there are items with less perishability of design and less volatility in development that can be acquired and stored with reasonable expectancy of use before overtaken by technological programs. But for most items, mobilization planning is the answer. This provides for the development and training of production personnel and production facilities in the manufacture of specific items. This latter approach would seem to be an effective policy for providing the greatest possible industrial potential to be convertible in the shortest possible time in order to provide the logistic support necessary for approved war plans.

2. Organization for Industrial Mobilization Planning

a. The Office of Defense Mobilization (ODM) was established in the Executive Office of the President for the purpose of providing one central agency to exercise strong leadership in our national mobilization effort. ODM is the top planning body for industrial mobilization and acts to apportion available material and production resources to satisfy both civilian and military needs. The Director of Defense Mobilization, being a member of the President's National Security Council, is able to give effect to the desires of that body in the formulation of overall defense mobilization plans.

b. The Business and Defense Services Administration (BDSA) of the Department of Commerce performs the mobilization functions which were once the responsibility of the National Production Authority (NPA). BDSA provides an organizational nucleus capable of expansion into a production and materials control agency in the event of an emergency.

c. The Emergency Procurement Service of the General Services Administration is responsible for procurement, storage, and handling of the national stockpile of strategic and critical materials. This stockpile includes those materials considered by some department of the Government to be critical as to availability and of strategic importance to any defense effort. Designated items and quantities are referred to ODM for final consideration and approval for stockpiling.

d. The Assistant Secretary of Defense (Supply and Logistics) is responsible for carrying out the National Industrial Mobilization policies

of ODM and for developing the overall policies and procedures relating to industrial mobilization planning in the Department of Defense.

3. Army Industrial Mobilization Program

The Army's Industrial Mobilization Program incorporates many separate activities and many different types of plans. The following are the more important of those activities and plans:

- a. Production Allocation Program.
- b. Industrial Preparedness Measures.
- c. Layaway of production equipment and facilities.
- d. Central inventory of reserve production equipment.
- e. Computation of mobilization requirements.
- f. Industrial Defense Program.
- g. Preparation of production data, inspection manuals, bills of material and other information related to production planning.

4. Production Allocation Program

This program includes the peacetime planning with industry for the production of critical items that will be needed for mobilization. The general objectives of the program are: First, to provide for the timely and effective transition of industry from peace to wartime production; and second, to coordinate the requirements of two or more government agencies or military departments for the output of a single plant. The production allocation program applies only to those items which in war are necessary for survival and retaliation, the maintenance of health, or combat efficiency. In addition to these characteristics, any given item, to be considered critical, must be one which has a relatively long production lead time, is needed by more than one service, or is characterized by some extreme peculiarity in production. It is necessary to scrutinize closely the real criticality of an item because planning is expensive and care should be taken to avoid planning for items which are solely for the purpose of comfort, convenience or morale, or for items which are generally identified as shelf-type items, or those which can be produced by existing facilities without undue delay.

Once criticality has been determined, the Production Allocation Program operates to discover

sources of supply or manufacture, to coordinate the requirements of the various services and departments, to foster mutual understanding between industry and the government concerning mobilization problems, and to develop overall plans for the optimum employment of the nation's industrial potential.

Since the Production Allocation Program is a voluntary one so far as management is concerned, it behooves the individual government departments to be realistic, consistent, and conservative in their estimates of mobilization requirements. Mutual respect and confidence should grow out of this program since it is hoped that the planning relationships will grow into good working relationships in time of war. The Armed Services Procurement Planning Officer (ASPPPO) selected for each plant represents the one or more Claimant Agencies (government departments) which have an interest in the production capacity of the plant. This individual is responsible for coordinating the government's requirements and the manufacturers' capabilities. Out of purposeful, intelligent coordination will come realistic schedules of production during mobilization.

It is intended that production allocation planning shall be as complete and detailed as the availability of personnel and funds will permit, in order to achieve the greatest amount of readiness for mobilization. Planning with a commercial firm includes planning for subcontract items, major subassemblies and components, as well as repair parts. Initial attention naturally goes to those items where production bottlenecks are foreseeable or anticipated. Thus it is seen that a continuous evaluation needs to be made of items critically in order that unnecessary planning is not done.

5. Industrial Preparedness Measures

a. General. When a new item is to be produced for the first time in quantity, when a new facility is called upon to produce any item for the first time, or when an item is to be produced by a new production process, it may be necessary to contract for certain production planning, production engineering or pilot production runs. These contracts are referred to as Industrial Preparedness Measures and are designed to shorten the span of time it would norm-

ally take a manufacturer to get into production in an emergency.

b. Types of Industrial Preparedness Measures. For convenience of description, Industrial Preparedness Measures are sometimes referred to as exploratory measures, engineering measures, and production measures. In some services these are referred to as Phase I, Phase II, and Phase III studies, respectively. Suffice it to say that *exploratory measures* are primarily studies which explore the extent of production capability in a plant, identify the problems which are likely to arise during production, determine possible modifications to the production process to enable the plant to make exactly what is wanted in the quantities desired, and any other plans that can be made as a result of a "desk study" of the production problem involved. *Engineering measures* generally include the redesign of items for mass production, redesign for elimination of critical materials, development of new methods of manufacture to save time or reduce scrap, development of plant layout, production equipment lists, flow charts, routing sheets, bills of material and lists of potential subcontractors, the establishment of pilot production lines, and any other measures short of actual production. *Production measures* provide for the actual production of limited quantities in order to test, prove and improve designs, manufacturing processes and production equipment, acquire the minimum technical know-how for later production in larger quantities, and uncover actual production bottlenecks not foreseeable or anticipated up to this time.

It would be hoped that current procurement programs would enable most Government contractors to develop the necessary production layout and the technical know-how for producing the desired items. But such cannot always be the case, and therefore, Industrial Preparedness Measures provide a positive, effective way for equipping manufacturers to do their best in time of emergency.

6. Layaway of Production Equipment and Facilities

a. Definition. The term "layaway" refers to the act of placing in reserve status any production equipment, or even complete industrial facilities, which are essential for mobilization production but are not needed for current require-

ments. Layaway can take several forms. The equipment can be laid away in place under power and maintained in a constant state of readiness to be put into operation. It can be laid away on the site in preserved storage, in place but under wraps and needing only to be deprocessed, hooked up and turned on. Equipment can be removed from its place in the production line to nearby storage or a central storage point at some distance. Combinations of these means of layaway are also possible.

b. Some Problems of Layaway. The Department of the Army has a huge investment in production equipment and facilities which were reactivated from reserve status or acquired new for the Korean production buildup. As this equipment and these facilities became idle, due to downward adjustment of current production programs, it became necessary to provide for their layaway in reserve status; to dispose of them as excess; or in certain cases to lease the Government owned equipment and facilities to contractors for commercial production. However, it is done, layaway and subsequent maintenance in reserve status is costly. It is therefore essential that each proposed layaway project be carefully considered before deciding on layaway and long term storage in reserve. The first problem is to determine whether or not the capacity represented by the Government-owned equipment and facilities is essential for mobilization. Factors to consider in making this determination include military importance of the product being produced; mobilization requirements for the product; availability of other capacity; status of the product with respect to obsolescence; and quantity of mobilization reserve stocks of the item on hand. Another important consideration is the status of the production equipment itself. Equipment to be laid away should be up to date by present industrial standards and suitable for the job to be done. It should also be in such condition as to require a minimum of rehabilitation for full capacity operation.

c. Inventory of Production Equipment. The Government has acquired a substantial inventory of production equipment primarily as a result of facilities contracts negotiated with manufacturers and materiel suppliers. In order to provide for coordinated and effective use of this

equipment it has been necessary to set up a central inventory of production equipment. This inventory is maintained by the Chief of Ordnance. Policy guidance on the utilization of Government-owned production equipment comes from the Office of the Assistant Secretary of Defense (Supply and Logistics).

7. Integration of Current Procurement and Industrial Mobilization Planning

a. Introduction. The Production Allocation Program described earlier provides for an orderly allocation of industrial capacity among the three departments, and for the peacetime development of mobilization production schedules with each planned producer for items to be produced in the event of mobilization. The placement of current procurement contracts with these planned producers for the items which they plan to produce under mobilization would serve to establish, maintain or improve their capabilities to produce under mobilization conditions. This principle is established to provide for integration of current procurement with the Production Allocation Program. However, aspects of providing adequate competition and the over-riding need of the Army to obtain the most for its limited peacetime procurement dollars makes it necessary in many cases to place contracts with other than the planned producers.

b. Procedures. The policies of the Department of Defense on integration of current procurement and industrial mobilization are carried out at the various departmental levels by the following means:

- (1) Award of contracts by procurement offices, whenever practicable and feasible, to spread the industrial base by:
 - (a) Placement with planned producers, other than past producers;
 - (b) Placement with current producers to maintain a "hot" base;
 - (c) Use of "leader company procurement" to develop additional planned capacity.
- (2) Establishment and maintenance of active liaison among procurement, mobilization planning and research and development activities, and coordination of actions taken with respect to these functions.

- (3) Cooperation between planning and procurement personnel and interchange of information between them in their respective fields.
- (4) Consultation of research and development activities by procurement and planning personnel in order to keep procurement and mobilization plans abreast of recent technological developments.
- (5) Submission by the procurement activity to planning offices of essential data on procurements as they occur. These data include copies of Invitations for Bid, bidders' mailing lists, bid abstracts, contracts and contract modifications.
- (6) Submission by the planning activity to procurement offices of essential data on mobilization planning as it develops. These data include lists of planned producers for planned items on preferential planning lists, information on status and progress of planning, information on contracts negotiated with planned producers for layaway of tooling and equipment and for industrial preparedness measures.
- (7) Placement of planned producers on all bidders' lists for negotiated and advertised procurement, with respect to the items for which planning was conducted.
- (8) Notification of ASPPO's with regard to placement of contracts with facilities in which other claimants have capacity allocations.
- (9) Request for production allocations or revisions in allocations on preferential items when awards are made to producers not in the planning program, or when the awards do not correspond to the planning previously accomplished with the facilities.

8. Summary

It is apparent from the foregoing that workable plans for mobilizing the industrial might of the United States are essential if this country is to react spontaneously and effectively to a future threat. It is patently unwise to endanger the national economy by disregarding costs in mobilization planning. It is financially impossible to insure complete immunity from all possible forms of enemy action. Therefore, mobilization planning must reflect a balance between the cost of readiness and the value of readiness. To this end it is hoped that current and future mobilization planning will improve and increase, and thus soften the blow if and when it comes.

I. MILITARY MANUFACTURING FACILITIES

In addition to procurement from civilian producers, the Army supplies a certain portion of its needs from its own manufacturing system, including arsenals, factories, and manufacturing depots. For the most part, this manufacturing organization produces items of a purely military nature, and in present periods of relatively high requirements it supplies only a small proportion of the Army's demands for these items. From the standpoint of supply management the importance of Army-operated plants and arsenals lies principally in three areas: research and development, pricing information, and flexibility of supply.

The Army arsenals and plants are an excellent source of research, development and production engineering information. The research and development work can be continuous, in contrast to individual research projects undertaken by inde-

pendent firms which are not so well experienced because of the noncommercial nature of the items. The Army facilities can employ a trained cadre of personnel on a full-time basis, devoted to nothing but the study of the particular items for which the facility is responsible. The information so obtained is then provided to private contractors in the form of improved specifications and techniques.

As a source of pricing information to aid Army contracting officers, the Army facilities are of limited value. They should only be used as a source of direct manufacturing cost information and not for total unit costs. Overhead costs of the Army facilities are hard to compare with those of private contractors. Methods of allocation are different, and the research and development mission of Army arsenals and plants is

often difficult to segregate from production. Direct labor and direct material costs should be comparable, however, since they depend upon the efficiency with which labor and materials are utilized rather than the volume of production or the extent of research and development. The direct labor cost may actually be lower for the Army facilities because of the availability of special materials handling equipment and greater experience.

Finally, Army plants and arsenals provide a limited flexibility in the supply of the items for

which they are responsible. Production lead time is no less than for private contractors, but initial production orders and changes can be put into effect with less delay than when a contract is involved. It is difficult to predict, *for example*, the particular sizes of uniforms which will be required by troops. At the Army clothing manufacturing center, therefore, production schedules are determined many months in advance, but the schedules of specific sizes in a lot are subject to change within two weeks of the time manufacture is scheduled to commence.

J. ADMINISTRATIVE OBSTACLES IN GOVERNMENT PURCHASING

Probably the one characteristic which distinguishes the procurement function from other elements of the supply system is the degree to which procurement operations are closely circumscribed by law. The Congress and the Bureaus of the Executive Branch of Government are keenly aware of their obligations and responsibilities to the American people. This awareness is reflected in the legislation, executive orders, and policy directives which are designed to safeguard the national purse strings and outline the methods by which the most may be obtained with procurement dollars. Due to the size and complexity of the governing bodies, full coordination and unanimous agreement is not always possible. This can result in occasional conflicts in direction. For example, contracting officers are encouraged on the one hand to do business with reliable responsible producers; and at the same time they may find themselves under considerable pressure to give contracts to unproved producers so as to broaden competition and the production base. There are other examples of procedural detail and policy conflicts which limit the authority and autonomy of contracting officers and result in less efficient purchasing.

Several legislative acts pertaining to labor have been enacted into law. There are statutes prescribing minimum wages, maximum hours, safe and sanitary working conditions and provisions for the use of child labor and convict labor. There are laws governing payroll deductions, frequency of payrolls, prohibition of rebates, and requiring the payment of wages at certain established rates. One of the oldest labor laws now in effect, the Eight-Hour Law of 1912, requires time-and-a-half pay for work in excess of eight

hours per day. Nondiscrimination in employment is required so that no potential employee may be discriminated against because of his race, religion, color, or national origin. At the same time, there is legislation in effect prescribing the limitations on employment of aliens and establishing a set of fair labor standards. In addition there is legislation specifying military security requirements for contractors who are producing items of a classified nature. Restrictions on foreign purchases are outlined in the Buy-American Act. There are additional restrictions on the purchase of certain supplies not mined or produced in the United States.

In accepting government contracts, contractors must accept contract clauses which embody the foregoing restrictions. Contractors are also governed by the provisions of the Sherman Anti-Trust Act; there are directives prescribing the extent to which blind-made and prison-made supplies can be purchased. Recognizing the economic desirability of placing contracts in areas where there is a labor surplus, contracting officers are advised to place procurement in such areas to the extent practical. Areas suffering flood damage and other disasters are similarly recommended to be the recipients of government contracts. However, in these latter two situations, no price differential is allowed in order to favor the labor surplus or the disaster area.

Probably the one piece of legislation which affects the largest number of producers and the largest number of contracting officers to the greatest extent is the Small Business Act. In this legislation it was the express desire of Congress that a fair proportion of all defense purchases should be made from small business—

firms having less than 500 employees. Among such firms many reliable producers have been discovered, developed and utilized; but among them also are many who never become financially stable. Contracting officers are hard put to "second-guess" the outcome of contracts with small business and must rely heavily on the advice of the field agents of the Small Business Administration. As a result of concerted coordin-

ated action on behalf of small business, it is an accomplished fact that small business concerns have gotten their fair share of defense business.

All of these administrative limitations act to water down the authority and flexibility of contracting officers and saddle him with a myriad of detailed considerations which do not confront the purchasing agents of private industry.

K. SUMMARY

1. Procurement Organizations

The procurement organization of the technical services is subject to considerable variations. All stations and a large number of depots have a certain local procurement authority. Central procurement, however, may be consolidated at one point and associated with supply and stock control, as in the Chemical Corps, the Transportation Corps and to a more limited extent in the Signal Corps. At the other extreme, the Ordnance Corps procures through a district organization covering the continental United States in cooperation with mission arsenals and other procurement centers. In virtually all services the contract administration function is separated from contract negotiation and award, and the administrative organization may be decentralized for closer coordination with manufacturers.

2. Analysis of Pricing Information

The preceding paragraph has indicated in several different connections the importance of procurement pricing information to supply management. The problem is far broader than the funding of an individual procurement. Changes in quantities, delivery schedules, and destinations all affect procurement prices, and these prices are related in every case to the costs of handling, storing, and distributing the supplies after they enter the distribution system. The cost of procurement in other words is an integral and major part of the total "cost to supply" for each item stocked by the Army. It must be noted that collection and presentation of pricing data are not enough; frequently these data must be appraised in the light of broad procurement experience to yield useful results. When step-ladder quotations are solicited for instance, as suggested above, certain manufacturers will bid

on an "all-or-nothing" basis, while others will achieve the same result by quoting unrealistic prices for quantities in which they are not interested. Interpretation of such data is necessary before useful conclusions can be drawn from it.

3. Interrelationships

A central theme of this chapter and of chapter 3 has been the close relationship between procurement, supply control and stock control for any item or commodity group, and the analysis of a commodity center plan as a means to achieve this end. The relationship involves the contribution of procurement recommendations in many cases before supply decisions are taken, as in the determination of a realistic procurement lead time. It may also involve the consideration of supply factors in making procurement decisions, as in the choice between the various forms of contracts. The effective management of procurement, therefore, is an integral and sometimes a major part of the effective management of supply.

The operation of the procurement agency as an isolated group of specialists whose performance is measured only by the effective execution of instructions received from supply authorities does not fulfill this concept. Frequently the basic supply management decision relative to an item or commodity must be made by the personnel responsible for procurement. The trend toward combination of central procurement with supply centers, and the development of overall experience in the production, sale, storage, handling, demand, and distribution of each commodity group are basic management steps envisaged by the commodity center plan which will approach the realization of this principle.

4. Procurement and Supply System

Without minimizing the importance of procurement pricing, the overall management of supply demands the evaluation of price in relation to the total supply picture. It must consider not only how much is paid for an item but how many of the items should be bought in the light of all the cost and other factors associated with

manufacture, purchase, transportation, storage and distribution of materiel to the ultimate user. This chapter, in concentrating attention upon the relation between procurement and the supply system, has attempted to cover an area less clearly defined at present, but of equal importance to the overall management of the Army's logistical system.

CHAPTER 6

STANDARDIZATION, CATALOGING, AND COMMODITY CLASSIFICATION

A. INTRODUCTION

There are just under one million cataloged items in the Army supply system, of these about three-fourths are centrally procured and stocked in the depot system. Another two or three million items *could* be ordered if the Army regularly stocked some of each and every item it uses. It must, therefore, be determined just what items will be procured, stocked, and issued. Just as a person might like, but cannot afford to have, a hat to go with every suit, and a suit for every occasion, neither can the Army afford every size and every color of every type of every kind of thing made. "Standardization" is the general term applied to the process of selecting from the many items available those items which should be procured, stocked, and issued by the Army; and if the procurement officer is to buy what is wanted and the depot is to issue what is requested, there must be a common language of supply with words and numbers that mean the same thing to people at all levels in the system. Moreover, the items must be segregated into manageable groups by a commodity classification system; and responsibilities must be fixed for each of these manageable groups. Unless this is done, an inventory as large as the Army's cannot be managed effectively.

Efforts toward standardization often are impeded by the exigencies of peace and war, and

feast-or-famine budgets. Before the damage from the last emergency can be repaired by throwing out the "cats and dogs" that came into the supply system, another emergency is on and the procurement officer is being pushed to buy everything in sight, including nonstandard items. Additionally, the absence of top level coordination of the technical services has sometimes led to the acquisition of large quantities of varying forms of similar items. Moreover, the Navy and the Air Force also have procured the variants that appeared to suit their needs best. So it was that early in the Federal Cataloging Program, the many variants procured by the various services, agencies, and bureaus began to pose major problems of standardization, identification, and stock numbering, and assignment of logistic responsibility.

This whole problem has been complicated because, in practice, both cataloging and standardization seem to follow rather than precede procurement. In view of the additional costs of stocking unnecessary variants as well as the accompanying confusion, standardization should precede both cataloging and procurement wherever practicable. This would seem almost an impossible task under emergency conditions, but the attempt should be made in order to reduce the number of variants entering the system.

B. STANDARDIZATION

1. Introduction

Fundamentally, the entire program for standardizing equipment and materiel for military purposes is directed at increasing the combat effectiveness of the Armed Forces. But in the interest of sustaining a war economy, it is also directed at conserving materials, facilities,

money, manpower, and time. Until the advent of Public Law 436, 82d Congress (The Defense Cataloging and Standardization Act), standardization efforts proceeded by voluntary coordination between the military departments themselves and between the military departments and other Government agencies. Now, Public Law 436 makes mandatory the achieve-

ment of the highest practicable degree of standardization throughout the Department of Defense. This will be realized by accomplishment of the following objectives:

a. Adoption of the minimum number of sizes, kinds, and types of items and services essential to military operations.

b. Achievement of the optimum degree of interchangeability of the component parts used in these items.

c. Development of standard terminology, codes, and drawing practices to achieve common understanding and clear interpretation of the description of items and practices.

d. Preparation of engineering and purchase documents to insure the design, purchase, and delivery of items consistent with the scope and purpose of the Department of Defense Standardization Program.

e. Provision by the military departments of the most reliable equipment possible by the adoption of materiel which has been evaluated in accordance with established Government specifications and standards.

2. Early Attempts at Standardization

Standardization, as all who have studied the sciences know, is nothing new. It began centuries ago with the establishment of systems of measurement by royal edict. Some early methods of establishing standards of weights and measures are rather amusing now. However, the fact that the need for standardization was recognized is important. Examples of some of the early methods of establishing our metric system are worthy of inspection today. *For example*, the distance from the tip of the nose to the end of the thumb of the extended arm of King Henry I of England became the present yard measurement. The average length of the left feet of sixteen church-goers in Elizabeth's reign became the foot. The total length of three grains of barley corn laid end to end became the somewhat vague inch. But, these were made standard for the whole of England and proved most valuable in blazing a trail to the precision instruments of measurement used today.

Standardization received its greatest impetus coincident with the Industrial Revolution.

Whether mass production methods grew out of, or demanded, concepts of standardization is a fact buried in antiquity. Mass production and standardization, in any event, were partners in industrial progress.

In America, the most notable early contribution to both mass production and standardization originated with Eli Whitney in 1798. As is the case with much technological development, it was military necessity which prompted it. Whitney had contracted to produce muskets for the Government. He conceived the notion that production speed could be increased and the replacement parts problem reduced if parts were interchangeable among muskets. It took him two years to tool up for the job. He had to devise standards of measurements within his own shop, develop standard templates, and plot and apply standard practices. Just as the Government was about to cancel its contract, muskets began to emerge from the little shop. Whitney's firm convictions regarding interchangeability and standardization were justified.

At the Battle of New Orleans, during the War of 1812, credit for the victory belonged not only to Andrew Jackson and Jean Lafitte, the loyal pirate; credit must also go to the fact that the British Army had more stands of arms returned to England for repair and replacement of non-standard parts than it had available for the troops in North America. The direct relationship of standardization to military effectiveness had been proven for the first time in American history.

3. Logistical Effectiveness of Standardization

The achievement of maximum logistical effectiveness at minimum cost requires that a minimum of items of supply be carried in the supply systems supporting our military forces. Reduction of the number of repair parts through standardization is particularly necessary to simplify our maintenance, which is performed with difficulty in combat areas even under favorable conditions. Deadlined equipment not only reduces combat effectiveness, but is vulnerable to enemy attack.

Standardization in these times of rapidly changing technologies is difficult, particularly since we must avoid retarding development.

Standardization can mean freezing design; however, it can also mean introducing a new design simultaneously in many items. Standardization demands producibility and production ease, and therefore coordination and cooperation with industry are essential. Industry and military standards provide the foundation for the program. Interchangeability of parts and components can be achieved only if the design, procurement, and manufacturing agencies use and refer to the same standards of dimensions, tolerances, and materials. Industry standards and specifications, such as those issued by nationally recognized engineering societies, are adopted and integrated in government standards and specifications when possible and applicable.

4. Methods of Standardization

Standardization within the Department of the Army is furthered by the following programs:

- a. Engineering Standards.
- b. Military and Federal Specifications.
- c. Military Standards for End Items and Components.
- d. Geographic Distribution.
- e. Procurement Without Advertising of Specific Makes and Models.

5. Engineering Standards

Industrial and military engineering standards provide an enduring foundation for standardization in that they prescribe engineering practices which are the same, that is, interchangeable, regardless of the plant or activity in which the practices are used or the equipment manufactured. Engineering standards represent firm agreements between large numbers of people or organizations, including industrial concerns, and frequently require an extended period for their development. Out of approximately 1,000 Military Standards now in effect, over 600 standards have been developed by the Army or through task groups in which the Army participated.

6. Standardization by Specifications

"Federal and Military specifications are used to establish common requirements for many products used by the Army, the Navy, the Air Force, and other Governmental activities. In

many instances the types, grades, and classes of products covered by a specification must be further limited within the Military Departments to accomplish desired simplification and standardization, however, the specification provides a basis for standardizing many technical requirements which eliminates a variety of similar requirements being placed on manufacturers, especially in the area of materials and components.

In the case of Military designed items, closer control of standardization can be and is effected by means of detail Military Specifications and drawings. The Army has a number of specifications in this category for Military combat items such as guns, tanks, bridges, mine detectors, and fire control systems.

A more difficult problem arises in the use of specifications as a media for standardization of semicommercial type items where the design is not completely controlled by the Army in detail design specifications and drawings. In this area the Army strives for the most practical compromise in specification requirements based on a combination of performance and specific material and component requirements. Although complete standardization is not attained by the procedure, standardization is nevertheless accomplished to a worthwhile degree."

7. Military Standards for End Items and Components

The adoption of standards for basic end items and for components offers major opportunities for various reductions. Military standards have been and are continuing to be developed and used in cooperation with industry. A notable example of progress is the Industrial Engine Standardization Program. This program consists essentially of standardizing in certain ranges of cylinder bore sizes of gasoline industrial engines the high mortality parts such as pistons, piston rods, rings, valves, bearings, etc. In the 2 to 6 inch cylinder bore size range, a total of 2872 items of parts were reduced to 207. After standards for the engine parts are produced, each participating manufacturer develops for military use modified versions of his regular commercial products using standard parts.

8. Standardization by Geographic Areas

Notwithstanding the practical and legal limitations on the standardization of specific makes and models, it is possible within the framework of the existing system to achieve some degree of standardization by geographic areas. Through the control of issues, specific makes and models can be standardized for particular theaters. In a given theater, for example, earth-moving equipment might be limited to the makes and models of only one or two of the available manufacturers, thereby limiting the range of parts to be stocked and simplifying the job for repair crews. Prior to movement overseas, the units would be issued the preferred makes and models of equipment, and subsequent shipments would be closely controlled by Overseas Supply Agencies at the Army Terminal to insure that the same manufacturer's makes and models were shipped. In many instances, however, the theater may already have in stock and in use the makes and models of several manufacturers. In attacking this problem the first effort should be devoted to determining the density of each make and model at all locations to ascertain how best to standardize in any given area. Normal attrition, rather than wholesale backhauls, can be used in evacuating the equipment no longer desired with gradual replacement by the selected makes and models. Repair parts for the models to be withdrawn must be returned and parts for the selected items built up in the theater.

During the exigencies of a war the pressure of events may make it extremely difficult to change the equipment already in the hands of troops before departure, and shortages may prevent the concentration of a specific make and model at a given locality. However, the problems of providing parts support for many different makes and models suggest the desirability of geographical standardization whenever conditions permit.

9. Negotiated Procurement in the Interest of Standardization of Equipment

The large number of repair parts that must be stocked arises partly from the effect of formal advertising. Award to the lowest responsible bidder often means that new makes and models enter the system creating a demand

for parts different from those previously stocked. This problem can be mitigated by use of negotiated procurement of additional quantities of the preferred make and model, rather than the chance acceptance of other makes and models new to Army supply, as a result of a different contractor being low bidder each time the item is formally advertised.

The Armed Services Procurement Act of 1947, the basic legislation governing military procurement, authorizes the procurement of selected makes and models of technical equipment by negotiation in order to achieve standardization and to insure interchangeability of parts and components. Because procurement by negotiation may tend to restrict competition, it must be utilized under close controls. Prior to the approval of procurement standardization of a particular item of equipment, the chief of the technical service must provide the Assistant Secretary of the Army (Logistics) with full justification. The justification must take into account such considerations as mobilization planning, present population of makes and models in the supply system, quantities of repair parts on hand, current and projected requirements, and performance data. Moreover, the standardization must meet the general requirement of being in the "public interest." These requirements, together with other applicable provisions of law, have restricted the extent to which standardization through negotiated procurement could be achieved.

Even when advantage is taken of procurement without advertising, care must be exercised to insure maximum standardization of components and repair parts. Vendors vary the components within their various makes and models. *For example*, a crane-shovel supplier may use two or more different powerplants in the same model, or a supplier of an engine generator set may employ various makes of engines with the same basic generator equipment. Close review of the items supplied by the contractor under these circumstances must be maintained by the requiring technical service in order to insure accomplishment of the standardization objective.

Final decisions on standardization actions are made by the Assistant Secretary of the Army (Logistics). In making such decisions, the As-

sistant Secretary must contend with the practical problem of pacifying the majority of available producers of an item, any one of which might be able to produce a satisfactory item. In times when business is slack, it is difficult to convince a supplier whose equipment is not selected that he has been accorded fair treatment.

Present policy favors standardizing on the products of a minimum of two manufacturers wherever practicable. Selection of at least two suppliers provides an increased production base in case of disaster as well as competition in negotiation.

Due to the extreme care exercised in this type of procurement standardization, the Army has approved only a limited number of items for procurement without advertising. However, these items include many which in the past have created major repair parts and maintenance problems. Included among the items standardized to date are road rollers, air compressors, tractors, cranes and shovels, 15 KW and 30 KW electrical generator sets, forklift trucks, radio receivers and transmitters, and bath units. Future schedules call for the submission by the technical services of standardization actions on many more types of combat support equipment.

C. CATALOGING

1. Introduction

Cataloging is a basic supply management tool of substantial importance and has an effect on other supply management actions. The commodity groupings for purposes of cataloging determine in large measure the organization for operation and management of the supply system. The Army's supply system is managed through commodity assignments and these assignments are determined largely by the commodity classifications in the catalog.

It would appear that the establishment of a common language of supply would not be a difficult task. It would be necessary only to assign a fixed name and number to each item, publish a mail-order-type picture catalog of military items, and the task would be complete. As in so many areas of Army supply, the task is not that simple. A fuller understanding of the Federal cataloging program can be gained by a brief description of its origin and development.

2. Federal Cataloging Program

a. Background of the Program. Federal supply cataloging traces its origin to before World War I when the Navy initiated a Naval Depot Supply and Stock Catalog. Later, the Navy Supply Bill of 1929 authorized the printing of a Federal Standard Stock Catalog. The task was assigned that same year to the Bureau of the Budget, but was transferred in 1933 to the Procurement Division of the Treasury Department. In 1935 the President approved regulations un-

der which the Assistant Director of Procurement of the Treasury Department would determine the articles and data to be included and to whom the head of each government department would report any articles which he desired to have listed in the Federal Standard Stock Catalog.

When the last Federal Standard Stock Catalog was published in 1935 it contained 155,000 items, the great majority originating in the Navy Department, although the Coast Guard, the Quartermaster Corps of the Army, and a number of other agencies also made use of the same numbering and classification scheme. During the late 1930's, the Procurement Division of the Treasury Department continued to monitor this catalog and issue stock numbers upon request from the various agencies using the identification scheme. However, during the buildup for World War II and during the early stages of the war, the users of the system began to expand so rapidly that the limited cataloging personnel in the Treasury Department could not keep abreast of the expansion. Numbers for newly procured items were required at a faster rate than a central agency could "clear" them, and while they continued to use the numbering scheme, two or more users began to insert the same item in the catalog under different numbers. Further, the tremendous expansion in electronics, aircraft, mechanized equipment, and repair parts created demands for new classes and more numbers than the system could accommodate. The Ordnance Corps, Signal Corps, Transportation Corps, and Corps of Engineers, as a result, developed their

own cataloging systems independently. Even the Quartermaster Corps, which used the Federal Standard Stock Catalog for its items, found the system unsuited to the identification of repair parts for mechanized equipment and introduced a separate identification scheme for repair parts.

b. Development After World War II. By the end of World War II a great many more items were being numbered and identified under independently developed cataloging systems than were being numbered under the Federal Standard Stock Catalog. Moreover, the Federal Standard Stock Catalog was literally bursting at the seams in many areas where sufficient space in the numbering scheme was not available to insert new items in proper alphabetic sequence. Also, the two-digit commodity classification, designed as it was before 1920, failed to accommodate adequately the new technological fields. During World War II there was wide recognition and comment on the duplication of items among the three military departments and among the services, agencies, and bureaus of the same department. This duplication resulted in competition by several departments, agencies, and bureaus for the same item, excesses of the same item at one place and shortages at another, and unnecessary expenditures of men, money, and materials to furnish the identical supply item to the military forces.

On 18 January 1945, the President directed the Bureau of the Budget to institute a uniform Federal Catalog System. A United States Standard Commodity Catalog Board under the general supervision of the Bureau of the Budget was formed. On 16 February 1946, this board submitted a report outlining a plan for the development and maintenance of a Federal Catalog System. Although funds were not made available for the immediate implementation of this plan, the report was the basis for further work in this field.

On 3 July 1947, a central cataloging agency was established within the Army-Navy Munitions Board. The military departments were individually represented and all other federal agencies were represented by the General Services Administration. Upon the recommendation of the Hoover Commission, the Congress passed

Concurrent Resolution 97 in April 1950 which stated, in part:

"The Secretary of Defense and the Administrator of General Services shall, based on their respective responsibilities, expedite the development of a coordinated plan looking to the completion of the Federal Catalog System in order that there shall be published and put into use at the earliest practicable moment a single supply catalog system to be used by all departments of the National Military Establishment and by all civil agencies."

The objective of the Federal Catalog System was stated in the same resolution:

"In the Federal Catalog System each property item shall have but one name and one description and one item identification number."

c. Method of Assigning Numbers. In order to expedite the program, all of the items handled by government agencies were divided among the participants in the program in accordance with the Standard Commodity Classification. Each category was assigned to a responsible agency, service, or bureau which was charged with developing a form of questionnaire about each different kind of item which would disclose salient facts about the item such as its dimensions, color, type, use, and so forth. These questionnaires are called "description patterns" and are drawn for every kind of supply item. The answers on the patterns are compared at Department of Defense level and if they reveal that the item being studied has never before been numbered, a number is assigned.

d. Federal Supply Classification (FSC). The Standard Commodity Classification, developed by the Bureau of the Budget in 1942, and amended in 1946, was used initially in assigning responsibilities for development of the description patterns. The participants in the program soon realized, however, that the Standard Commodity Classification, the Federal Standard Stock Catalog classes, and any of a number of other classification systems in use within the government failed to provide a commodity classification structure that would be useful for supply management purposes. For example, among other

criticisms, the Standard Commodity Classification was thought to be too detailed and the Federal Standard Stock Catalog classes too broad. A classification committee made up of representatives of the Army, Navy, Air Force, General Services Administration, and Munitions Board was formed for the purpose of developing a commodity classification structure to be used with a seven-digit nonsignificant item identification number. This committee recognized that any commodity classification system would have to be a compromise between conflicting interests; no one system could simultaneously classify an item for all purposes, as discussed earlier in this chapter. The committee finally agreed that the commodity classification system would be designed to the maximum extent possible to serve three primary purposes: (1) stock accounting, (2) requisitioning, and (3) issue. The committee settled upon a four-digit code. The first two digits would represent large groups of related items, and the second two digits would represent classes within the group. *For example:*

Group 51--	-----	Hand tools.
Group 51--	Class 10--	Hand tools, edged, non-powered.
Group 51--	Class 20--	Hand tools, nonedged, non-powered.
Group 51--	Class 30--	Hand tools, powerdriven.
Group 51--	Class 40--	Tool and hardware boxes.
Group 51--	Class 80--	Sets, kits, and outfits of hand tools.

e. Implementation of the Federal Supply Classification. In order to test the validity of the structure the committee had developed, every supply item in the Army, Navy, Air Force, and General Services Administration was indexed against the system. Where it appeared that classes were too large or too small or represented heterogeneous material or where no class existed for certain items that were not anticipated, the structure was revised accordingly. Completed indexes have been published to show the class to which each item in the military departments is assigned. It is to be noted, therefore, that the development of a classification structure under the federal program is a completed task. Although it may be subject to many imperfections, full implementation and use of this commodity classification can be a management tool of substantial importance.

f. Complete Federal Stock Number. "Federal

stock numbers have now been assigned to all Army items of supply and conversion of supply operations to use of the new identification data was completed 30 June 1957. The following illustrates the format of the complete Federal stock number as assigned to some typical items:

<i>Federal Stock Number FSC Class Code No.</i>	<i>Federal Item Identification No.</i>	<i>Federal Item Name and Description</i>
5110	595-8296	FILE, HAND: American pattern, hand saw, blunt, 6 in. long—heel to point, single cut band saw faces.
5110	224-1532	PLIERS, DIAGONAL CUTTING: with stripping notch, sleeve openings and skinning hole, 5 in. long.
5110	180-0664	SHEARS, METAL CUTTING, HAND: straight pattern, 13¾ in. long overall.
5120	293-1138	ANVIL, BLACKSMITH'S: steel face and horn, cast iron body, 10 lbs.
5120	293-0665	BAR, WRECKING: gooseneck, claw and pinch point, ¾ in. dia, 30 in. long.
5120	180-0554	SCREWDRIVER, FLAT TIP: wood handle, straight tip, ½ in. wide, 6½ in. long blade.

It will be noted from the illustration above that when items are arranged in alphabetic sequence within the commodity class, the nonsignificant seven-digit numbers will only coincidentally be in sequence. For this reason, current Army Supply Manuals contain an index in stock number sequence which shows where the nonsignificant numbers may be found in the alphabetic listings within classes."

g. Repair Parts. Under the Federal cataloging program "parts peculiar" are classified with the next higher assembly in the class established therefor. The term "higher assembly" is used for brevity and may actually include sub-assemblies, assemblies, components, end items, or systems. However, a large number of Federal Supply Classes have been established specifically for "parts common", such as bolts, nuts, screws, bearings, common electrical components, common gears, etc. Although the intent of the Federal Supply Classification system was to include all bearings in the common bearing class, all bolts in the common bolt class, etc., there is now a provision permitting particular bearings, flexible hose and tubing, etc., to be classified with the next higher assembly. If this provision is

applied too widely, the consequences can be a general corruption of the classification structure. Moreover, it would permit duplicate cognizance of common components, by classifying the same common component with different end items.

All repair parts are numbered with the same type of nonsignificant seven-digit number that is applied to end items. No effort is made to arrange parts in alphabetic sequence, to relate them to the machine they fit, to relate them to the functional purpose within the machine, or to give any other significance to the identification number. If the part is peculiar, the four-digit Federal Supply Classification number added to the nonsignificant seven-digit part number will identify the classification of the next higher assembly on or with which the part is used. If the part is common, the classification will merely indicate the category of common items to which it belongs.

All repair parts that any agency wants numbered are passed through a central screening point where the manufacturers' numbers are searched against master files to determine whether the part has been previously identified with a Federal number. The necessity for this central screening process developed early in the federal cataloging program when situations like the following occurred:

- (1) Army Ordnance found that Chrysler part number A-234 was a common machine screw that could be described by size, type of metal, etc., and had cross-referred Chrysler's number to an Ordnance number.
- (2) Army Engineers discovered that General Electric part number 4B512 was the same common machine screw and had cross-referred it to an Engineer number that "spelled out" the size and type of machine screw.

- (3) The Navy found that International Harvester part number 123456 was likewise the same size and type of machine screw and had cross-referred the part in its cataloging system to its end item stock numbering series.

By relating all of the above facts, Army Ordnance discovered that General Electric part number 4B512 and International Harvester part number 123456, which it also had in stock, could be combined with the Chrysler part number A-234 that it already knew to be a common machine screw. Similarly, the Army Corps of Engineers and the Navy were able to utilize the research done by the others. Association of all these facts prevented the assignment of three Federal identification numbers to three manufacturers' parts that were in fact identical.

h. Summary. The Federal cataloging program will provide the Army with an improved management tool. When the program is implemented, the Federal Supply Classification will be used in almost all supply functions. The classification codes that are a part of the complete federal number will be transcribed on all requisitions, on all stock record accounts, and on all stock status reports. Although additional codes may be superimposed, the practical difficulties of transcribing and using extra codes suggest that the Federal Supply Classification will normally be used in virtually all accounting and reporting of supply information.

Despite the advantages of the Federal cataloging program, many of which have been stated or implied in this chapter, its implementation will create the need for management decisions, particularly with respect to duplication of common items. Some of the aspects of this problem will be considered in the remaining paragraphs of this chapter.

D. COMMODITY CLASSIFICATION

1. Introduction

Possibly no aspect of cataloging is of more concern to management than the grouping of items into commodity classes. In earlier chapters we have talked about principal items, secondary

items, commercial items, major items, long lead time items, slow-moving and fast-moving items, high cost items, repair parts, and end items, etc. In each of these instances, supply items have been "classified" into groups. But none of these groups can stand alone; *for example*, there are high and

low cost commercial items, fast and slow-moving end items, and any of a number of other combinations. Although we may be interested in principal items because of their impact on the procurement program or low cost commercially available items for purposes of fixing supply responsibilities, neither type of classification would be suitable for many other purposes in the supply system.

There is no single classification system that will result in a grouping of items satisfactory to the needs of all users. Those concerned with the allocation of critical materials, *for example*, are interested in material content; to them copper wire and copper kettles are similar items. Requirements analysts, on the other hand, are concerned with what items are used for, by whom, and in what quantity. The maintenance people are interested in the relationship of repair parts to end items. The storage officer is interested in the type of storage required; for his purposes flashlight batteries and photographic film are related items. The stock control officer is concerned with relationship of items in use; *for example*, the relationship of paper towels to toilet soap. These varying interests and relationships can take a thousand forms.

2. Design of Classification

Obviously the approximately one million supply items cannot be segregated and published in a dozen or more arrangements, each complete and tailored to meet the needs of one specialty. Indeed, it is reasonable to inquire whether it is possible to satisfy any one single interest. If the classification is designed for the user, immediate conflict develops because the same item has more than one use. If the classification is designed exclusively to fit the demands of stock control, conflict again develops. Stock control's interest may lie in a distinction between slow-moving and fast-moving items or in the relationship of certain items to the seasons of the year or in the relationship of demand for dissimilar items, all of which cannot be met by a single classification system. Each interest in supply items might be similarly examined and the same conclusion reached in all cases: no system of classification can completely satisfy the needs of any single element of the supply system.

If it is impossible to make everybody happy or even anybody completely happy, why classify items at all? The answer to this question must start with the person who attempts to find in a catalog the item he wants. If the items are in alphabetic sequence by name and he is looking for electrical supplies, the fuses, junction boxes, lamps, switches, and wire he may need would be listed from one end of the catalog to the other. In this instance, collection of the items by relationship would assist the user to find the electrical supplies he wants. If he needs a tool, his location of the exact tool would be facilitated by a grouping of all tools together. On the other hand, if we assume he is an electrician and that he wants a tool for electrical work, we can help him no further; we cannot separate electricians' tools, carpenters' tools, plumbers' tools, and mechanics' tools because some of the same tools such as files, screwdrivers, and pliers are used by all these trades.

3. Classification by "What It Is" or "What It Is Used For"

A closer examination of the electrical supplies mentioned in the preceding illustration will serve to illustrate the most perplexing problem in commodity classification, whether to classify an item on the basis of "what it is" or "what it is used for." Electric lamps are produced for two major uses: (1) illumination in houses and offices, generally for 110 volts; and (2) for automotive-type use where they have miniature bases and operate at from 6 to 24 volts. (Lamps for surgical instruments, radios, airfield lighting, etc., are examples of further diversification.) Should the commodity classification system group all electric lamps on a "what they are" basis, or separate them on a "what they are used for" basis, such as airfield lighting, automotive use, house use, etc? In general, the supply manager concerned with miniature automotive-type lamps is not also concerned with supplying the larger lamps used in houses and offices. On the other hand, many of these lamps have wandered out of their original restricted usage: large lamps are designed for low voltages and miniature lamps are also designed for 110 volts; the same miniature lamp may be used in a radio set, a plane, a bus, or in a piece of surgical apparatus.

In general, most of the commodity classification systems in use by the Army prior to the establishment of Federal Supply Classification were based on the grouping of items related or associated in use: surgical instruments, materials handling equipment, construction machinery, laboratory apparatus, etc. The classifier starts with the premise that he will group all items related in use and then proceed to pull out of the specialized use categories those items that cut across the specialized categories such as tools, bolts, screws, and common hardware which have multiple uses. In the case of surgical instruments, *for example*, there are enough items peculiar to that application to make up a useful grouping. On the other hand, there are not enough items peculiar to the plumber, the automotive mechanic, and the carpenter to produce useful classes of plumbers', mechanics', and carpenters' supplies.

There is no neat and precise way of settling the inherent conflict between classifying on a "what it is" or "what it is used for" basis. In certain well-established commodity areas such as tools, pipefittings, bolts and screws, rivets, and cotter pins, where the multiplicity of end uses has been recognized over a period of many years, classification on a purely "what it is" basis is accepted and incorporated into virtually all commodity classifications. It is in areas of expanding technology where the initially "peculiar" item is becoming "common" that the major problems are posed for the supply manager. Electronic equipment and supplies are a prime example of items of this kind. Classification cannot, therefore, be rigidly fixed, because the peculiar item of today is the common item of tomorrow. Electronics, *for example*, is now in such a state of flux that today's classification of electronic equipment, devices, and supplies will fit tomorrow's needs only by the purest chance. Decisions on these basic classification questions, which have the effects of determining commodity responsibility and deciding whether items will be duplicated within the supply system, have generally been left to the discretion of the cataloger. Thus, the cataloger is placed in the role of a supply manager, a role for which he is not always qualified.

Some of the principles of commodity classifica-

tion as they relate to the Army Supply System may be summarized as follows:

a. The cost of publication and maintenance of publications prohibits more than one basic commodity classification system.

b. A single commodity classification system cannot simultaneously group items to the maximum advantage of any one element of the supply system.

c. The commodity classification system should, therefore, to the extent possible, group items for the benefit of those who are most directly concerned on a day-to-day basis: the ultimate users of the supplies and those directly concerned with meeting that demand.

d. Items should be grouped to the extent possible by their association in use, excluding from the groupings by end application those items with multiple uses and applications.

e. Management is directly concerned with the commodity classification system because these groupings dictate, from a practical point of view, commodity responsibility and the presence or absence of duplications in procurement, storage, and issue.

f. Commodity classification must remain fluid. If it is to serve as a management tool, it must be responsible to the changes that occur in the use of items.

4. Duplication of Items

a. *Focusing Attention on Duplication.* The implementation of the Federal cataloging program has focused attention on some of the duplications that exist among the technical services. There are instances where more than one service has supply items in the same Federal Supply Class; this eventually will show up in financial and quantitative reporting. Since all services will use the same seven-digit identification number, duplications within the same commodity class will also stand out. It is generally recognized even now that some duplication exists, and it may well be that much of it is inevitable. But former differences among the technical services in commodity classification systems, stock numbers, and names of items made it difficult to determine the extent of the duplication.

b. *Causes of Duplication.* In theory, there is

no duplication among the technical services. Ordnance handles weapons, ammunition, and vehicles; Engineers handle construction, bridging, and mapmaking equipment; Quartermaster handles food, clothing, and general supplies, and so on. There is no duplication in the issue of mimeograph paper, tanks, forklift trucks, locomotives, food, tractors, and other major end products which could be termed "common use" items. An examination of a few of the end products handled by each service will show where the problem develops:

Ordnance:	Trucks, passenger cars.
Engineers:	Tractors, earth-moving equipment.
Transportation:	Locomotives, barges, boats.
Quartermaster:	Forklift trucks, mobile laundries.
Signal:	Mobile radar sets.
Chemical:	Gasoline engine-driven, decontaminating apparatus.
Medical:	Trailer mounted disinfectors.

In the examples cited above, every end product contains a gasoline or a Diesel engine, bearings, nuts, bolts, screws, wire, and all of the mass produced parts and subassemblies that go to make up such end products. Although Ordnance supplies and maintains the trucks in which some of the mobile equipment has been placed, the various services procure and maintain the equipment on the truck including the engines that drive the machinery on the truck. To maintain such equipment, all of the services require identical or substantially similar tools, equipment, and supplies. To some extent, all of the services procure, stock, and issue the common tools, hardware, equipment, and supplies required to maintain these end items.

5. "Supply Must be Responsive to Command"

It has, of course, been recognized that there is some duplication of procurement, stockage, and issue of the same supplies. However, there has been a tendency to minimize its seriousness by emphasizing that "supply must be responsive to command." In its broadest application, the term means, *for example*, that if the Navy has a task to perform, the Navy should have control

over the tools required to accomplish the task. The concept has been projected downward to mean that if the Ordnance Corps is to furnish and maintain vehicles, it should be provided with the means of doing it, that is, the parts, tools, and supplies needed. Similarly, if the Quartermaster Corps is to furnish and maintain forklift trucks, it should not be required to depend upon other services for the tools, equipment, and supplies needed to perform its mission. Of course, if the concept were carried to its ultimate extreme, every service would supply its own clothing, food, and ammunition. The question is: Where within the two extremes of procurement and issue by one technical service or procurement and issue by all services should the line be drawn?

The desirability of one technical service procuring, stocking, and issuing universally used office stationery items such as pens, pencils, paper, and paper clips has been recognized and carried out. But the electron tubes, spark plugs, electric lamps, and tools and hardware that are used almost as widely raise slightly different problems and are treated as exceptions. If a requisitioner wants a bearing, spark plug, piston ring, miniature electric lamp, or any other item which is common to several pieces of equipment, he must go to the technical service on whose equipment he intends to use the item.

6. Assignment of Responsibility for Common Use Items

"The first effort to eliminate duplicate assignment of responsibility for common use items between Army technical services was the establishment of the Procurement Assignment Board in July 1948. As indicated by its title however, this board dealt only with the procurement and inspection function. Early in 1950, another important step was taken toward solution of this problem through a program outlined in AR 700-51 and implemented by Special Regulation in the 700-51-100 series. Although these regulations resulted in the reassignment of certain of the duplicated items to particular services, the program achieved only partial success due, mainly, to the lack of a standard item identification and classification language. This, of course, was the objective of the Federal cataloging program which at that time, had barely gotten under way.

Today, the Federal Catalog System is a fact; all Army items have been identified by the same set of rules and classified under one system of commodity classification (the new Federal Supply Classification); and a new program of reassignment of all logistic functions, using these new tools, has been inaugurated. Details of this program are being announced to the field in regulations. The problems encountered in this program are still extremely complex and will require continued study."

Yet the duplicate procurement and issue of certain common items can often result in situations that require management attention. *For example*, one technical service inventory control point learned that it was out of stock nationally on a common use item. The item was being researched because of a proposed letter that would have denied supply for a period of twelve to eighteen months pending reprourement. It was subsequently found that the identical item was stocked by two other technical services and that one of these services had on hand a four years' supply.

Clearly, situations of this kind are undesirable, and result in:

a. A larger number of stock record accounts, with the attendant costs of maintaining the records, taking physical inventory and reporting the balances to higher headquarters.

b. Subdivision of the overall quantity of stock into smaller quantities at many locations, which may result in denial of supply at one location because of the normal imbalances that occur in any supply system.

c. Dissipation of assets of critical materials in times of shortages by maintaining larger stocks than would be necessary if the stock were located at fewer places.

d. A larger number of procurement actions and smaller, more expensive shipments.

e. Confusion in supply responsibility because the requisitioner's source of supply is governed not by "what an item is" but by "what he uses it for."

If the 700-51 Special Regulations resulted in satisfactory assignments of items such as generators to the Corps of Engineers and pencils

to the Quartermaster, why should they not be extended to tools, hardware, electrical items, spark plugs, and other items with many end uses? Any answer to the question must take a number of factors into account. In the first place, it may be impracticable to assign bolts to one service, spark plugs to another service, common electrical and electronic hardware to another service, tools to another, and so on. If the Army Medical Service is to continue to be responsible for the maintenance of X-ray machines, the Quartermaster for laundries, the Engineers for earth-moving equipment, and the Transportation Corps for rail equipment—to cite only a few examples—determining the sources of supply for each component of these end products could place heavy burdens on the requisitioner. Is a bolt a Quartermaster bolt, an Engineer bolt, or an Ordnance bolt? Which service should procure, stock, and issue all small electric switches? Because the preponderant use of such items is as parts common, and the Ordnance Corps is the largest single service supplying and maintaining machinery, should the Ordnance Corps be assigned responsibility for everything except a few large end items?

7. Summary

It has been observed that in theory there is no duplication between the technical services; each service is a commodity specialist. In terms of major end items, the duplication is negligible, but there is an appreciable volume of duplication of the common components of machinery and equipment as well as of the equipment and supplies to service and maintain large end products. Where items are assigned upon the basis of "what they are used for" rather than "what they are," multiple assignments of the same commodity must follow. And where duplication exists, there is a direct increase in inventory and operating costs and there may be delays in supply.

American mass production techniques result in duplication of components among end products. Yet the reassignment of responsibilities for common use items by technical service, without regard to who makes the most use of the item, will result in confusion as to source of supply. On the other hand, reassignment by preponderance of use will result in most of the

items going to the Ordnance Corps. Neither of these alternatives appears to be a satisfactory solution.

The Navy has attempted to solve essentially the same problem of duplication among its bureaus by assignment of common use items to

the Bureau of Supplies and Accounts. Whatever final solution is worked out by the Army, implementation of the federal cataloging program will tend to focus attention on supply responsibilities and may lead to the resolution of an extremely difficult management problem.

CHAPTER 7

MAINTENANCE AND REPAIR PARTS MANAGEMENT

A. INTRODUCTION

This chapter consists of two parts: the first discusses the function of maintenance and the second deals with the supply of repair parts necessary to maintain equipment. Together, the two parts form an area of substantial importance to supply management. Proper maintenance of equipment increases its lifetime of usefulness, reduces the requirement for new material and conserves funds for other purposes. Thus, maintenance cannot be separated from supply; indeed, the repair and rebuild of equipment is an important added source of supply.

The complexities of the repair parts problem in Army supply have already been suggested in chapter 6 on cataloging and will be discussed in greater detail in this chapter. From 80% to 90% of the line items carried in the supply system are repair parts of one kind or another. It has been estimated by one of the technical services that it costs more than \$3,000 to add a new part to its inventory. The fewer repair parts the Army can stock, the more attention it can devote to managing the supply of those parts actually stocked. Current policy is to maintain minimum stockage.

B. MAINTENANCE

In this section of the chapter, aspects of the maintenance function will be discussed. After giving an indication of the scope of the task, the section will continue with a brief analysis of military and civilian maintenance, followed by a description of the Army's maintenance system. The section ends with some comments on the economy of maintenance.

1. Maintenance Function

a. Scope of the Task. The word "maintenance" has various meanings in the Army, but in this chapter its meaning is limited to the activities necessary to keep equipment in serviceable condition. These activities would include inspecting, testing, servicing, classifying as to serviceability, renovating, reclaiming, repairing, rebuilding, and modifying materiel. Many of these same activities are also necessary in the care and preservation of materiel in storage; in this chapter, they are described in terms of maintenance of materiel that has been issued to the field.

The maintenance problem faced by the Army arises directly from the fact that the U. S. Army

is the most highly mechanized Army in history. As the Army becomes more and more mechanized, maintenance takes on increasing importance. The term "mechanized Army" usually suggests only vehicles and mobile equipment. Yet these items represent only a part of the whole maintenance problem. Mechanization of the Army has included also the whole range of equipment used by combat and service forces: guided missiles, radar, and other electronic equipment, portable and mobile shops, laundries, dental laboratories are only a few of the complex items that require maintenance. Nor is maintenance limited to large, complex items. The carbine, the surveyor's level, the walkie-talkie and almost everything the soldier uses require repairs and replacement of parts. Measured in terms of the number of items shipped out of the depot system, more items are consumed for maintenance than for any other purpose. During Fiscal Year 1956, 52.8% of the Supply, Distribution, and Maintenance Program funds were obligated for maintenance activities. Maintenance shop operations, including parts consumed, cost over \$600 million

during FY 1956. From the standpoint of supplies used, the maintenance task is equally impressive. With the exceptions of feeding and clothing the Army, maintenance activities require more supplies than any other Army activity. These supplies consist largely of tools, equipment, repair parts, and various expendable items, such as oil and wiping rags. Clearly, supply supports maintenance, and maintenance supports supply in a continuing cycle.

Anyone who owns an automobile or a television set can appreciate the Army's maintenance problem. The ten dollar repair bill for the new spark-plugs or the damaged tube is multiplied a thousandfold in keeping the Army's vehicles and equipment in operable condition. As with civilian goods, it is sometimes not the initial cost but the upkeep expenses which become troublesome. Yet a gun that does not fire, a jeep that will not start and a radio that will not work are dangerous liabilities, because manpower, materials and transportation space were consumed in getting them where they were needed. Maintenance of existing equipment may be as important as the acquisition of new equipment, and in an extended cold war period, may be more important. The combat readiness of troops bears a distinct relationship to the combat readiness of the equipment in which and with which they fight. The ability to maintain arms and equipment may spell the difference between defeat and survival.

It is essential in all stages of development work that adaptability of an item to quantity production, to ease of maintenance and to low maintenance costs, its effect on the supply of strategic and critical materials, and interchangeability of parts be considered as among the most important requirements of design. Consideration should also be given to accessibility of fittings, adjustment points, and accessories for periodic servicing, as well as replacement of parts and assemblies to permit expeditious and simplified maintenance.

The economy of maintenance, in materials and manpower, is equally significant. Maintenance obviously is uneconomical if it costs as much to maintain the old as to acquire the new. Similarly, uneconomical are labor, materials, and transportation devoted to parts which are

not used. In determining maintenance policies, the economic considerations are often governing, as will be discussed in a later section.

b. Complexity of Task. The varieties of climate, terrain, and kinds of use complicate the maintenance task. The kind and frequency of servicing, the kind and number of parts required and the types of maintenance skills and facilities all bear a direct relationship to these factors. The variety of makes and models of the same basic equipment also add to the difficulties. Many of these problems are treated at some length in the repair parts section of this chapter. It is perhaps sufficient at this point to mention that the large number of makes and models of the same equipment poses the same problem to the Army's maintenance facilities as that of the corner garage which repairs the 1946 Ford, the 1950 Chrysler, and the 1954 Lincoln. Not only must the parts be readily available, but the mechanics must have the skills to work on all of these different machines.

c. Demand for Maintenance. Some of the demands for maintenance are predictable, recurring demands such as those a person experiences with his own automobile. The oil must be changed, the chassis lubricated, and the motor tuned after a certain number of miles. Similarly, experience has taught that an engine must be overhauled after so many hours or miles of operation, or a gun barrel must be replaced after so many rounds have been fired. In addition to the hours or miles of use and the mere passage of time, rough and hilly terrain, extremes of dampness, heat, cold, and other environmental factors influence the amount and type of maintenance required to keep equipment operating efficiently. The global dispersal of Army equipment—Greenland, Africa, and the Pacific Islands—suggest the variations in the demands for maintenance. "Normal" use as opposed to hard, around-the-clock use can profoundly affect maintenance demands. Combat damage and the damage caused by accident-prone or careless individuals also, of course, increase the maintenance workload.

2. Military and Commercial Maintenance

a. Introduction. The present U. S. Army has roots in the old English military system in

which the citizen was ordered to present himself complete with sword, musket, food, and clothing to defend his community. As weapons increased in complexity and larger numbers of men were involved, this practice of having the civilian soldier bring his own weapons began to be modified. The citizen could not be expected to have a home supply of cannons, for example. As early as 1631, King Charles I of England, faced with this problem, decreed that standards of "Pikes, Guns, and Bandoliers" would be established and controlled by the Lords of War. In this country, Eli Whitney is generally considered to be the pioneer in recognizing the need for interchangeable parts for ordnance materiel.

It was not until World War II that maintenance became a major burden for Army supply. During World War I, the Army relied almost entirely on manufacturers' representatives, who were present in the field, for repair parts advice. Little more was needed than a portable blacksmith's shop. All this was changed by the mechanization of the Army that took place between the two World Wars. The highly mobile forces deployed in Europe, Africa, and the Pacific required a network of maintenance facilities and large stock of parts for needed close maintenance support. The major share of the burden fell to Army units, in marked contrast to the maintenance and repair parts situation in World War I.

b. Limitations of Commercial Maintenance. If all of the Army's forces were always located within the continental United States, maintenance by commercial facilities or by the original manufacturer of the equipment might be feasible. The global aspects of the nation's military commitments and responsibilities preclude this easy solution. The Army's repair facilities must be almost as mobile as the equipment for which the facilities exist. Maintenance personnel must be prepared to endure the same hardships and dangers which face combat forces and must be under the same overall command. It is difficult to conceive how the oversea maintenance needs of a modern mechanized Army, prepared for war at various points on the earth's surface, could be met by commercial organizations. Not the least of the problem is the variety of makes and

models used by the Army. *For example*, the Army may have tractors produced by Caterpillar, International Harvester, and Allis Chalmers. It would, of course, be impracticable to have repair shops organized and manned by these manufacturers accompany the tactical units which used the tractors. Limited assistance might be provided by the manufacturers through the assignment of technical personnel who could furnish advice on particular problems that arise in the maintenance of their equipment.

Within the continental United States, maintenance by the manufacturer is feasible where mobility is not an important consideration. Even within the continental limits, however, sole dependence upon the manufacturer is undesirable since troops must be accompanied by their own maintenance facilities and personnel upon departure from the United States. For this reason, Army facilities and training within the United States should be designed to meet any demands that may be placed upon the troops, even if a substantial part of the maintenance task within the continental limits were accomplished through commercial facilities.

c. Manufacturer Assistance. Although maintenance by the manufacturer is impracticable overseas and limited in its usefulness within the continental United States, there is a growing need for manufacturer assistance as the equipment of warfare becomes more complex. The technological advances in electronics, *for example*, force a type of specialization that is difficult to provide under present draft limitations. It may take upwards of a year to train an electronics technician. This period, when added to the time required for induction, basic training and so forth, leaves only a few months for the technician to apply his new skills before his military service is completed. Yet, as has been described above, the facilities and manpower for maintenance of Army equipment must come largely from within the Army itself; the technical know-how, on the other hand, must come increasingly from outside the military ranks. The longer length of service that can be expected from manufacturer's personnel, together with the technical knowledge they already possess, make it imperative that assist-

ance of this kind be a part of the Army's maintenance plans..

d. Commercial Maintenance Contracts. Whereas major reliance cannot be placed upon commercial maintenance facilities, either overseas or in the United States, there are instances where it is desirable to employ commercial contractors for more than technical assistance. Much of the military equipment in the United States lends itself to commercial maintenance. *For example*, the Army, like the other services, owns a large stock of machine tools which are made available to manufacturers in times of mobilization. The maintenance and upkeep of these tools can probably be handled by commercial services more easily than by the Army. Moreover, the heavy type of base repair that requires large fixed installations and a variety of machinery lends itself to contractor maintenance. The factor of mobility is not an important consideration here because installations of this kind could not be easily transferred to a theater of war.

In oversea areas, contractor maintenance and the use of locally available labor offers advantages in many instances. The success of the Japanese mechanics in rehabilitating rolledup equipment from the Pacific Islands is a case in point. In Europe part of the maintenance task has been assumed by European contractors. The Air Force, through Project Native Son, was better able to adjust to personnel cutbacks by making greater use of foreign labor in maintaining oversea air bases and equipment.

In the selection of contractors for commercial maintenance, it is necessary to examine the adequacy of the contractor's personnel and equipment, to study his past performance, present and projected workload and to evaluate his managerial ability and integrity. The comparative costs of commercial and military services must also be considered. Whether the contract should be performed under a cost-plus-fixed-fee arrangement, on a piecework basis, on a time-and-material basis or with escalation and re-determinable provisions must be determined on the basis of the type of repairs and the amount of equipment to be maintained. Frequently the extent of repair necessary for any unit is not

known until the unit is disassembled and thoroughly examined. In these cases a "tear down and quote" method of contracting may be used with commercial concerns, with a fixed price for disassembly of the unit, followed by a further quotation on the repair job.

3. Maintenance Organization in Army

a. Introduction. Armywide staff supervision of the maintenance function is the responsibility of the Materiel Maintenance Division of the Office of the Deputy Chief of Staff for Logistics. This division establishes broad maintenance policies. The technical supervision over all phases of maintenance is the responsibility of the technical service which issues the particular piece of equipment. Exceptions to this general rule are Army aircraft procured, issued and provided depot maintenance by the Air Force, and equipment furnished to the Air Force by the Army technical services but maintained by the Air Force. The technical services establish maintenance procedures and service standards. They publish catalogs, technical manuals, servicing and operating instructions. Depot maintenance is performed under the direct supervision of the chiefs of the technical services, except in oversea commands. The technical services also collaborate with the Commanding General, USCONARC, in developing training programs and furnishing technical advice to troop units and field maintenance organizations. The maintenance work itself is accomplished at various echelons, which are described in the following paragraph.

All commanding officers are required to insure that all equipment issued or assigned to their command is properly maintained in a serviceable condition, and that equipment is properly cared for and used.

As distinguished from command responsibility, there is a direct responsibility assigned to individuals to whom equipment is entrusted for their personal use and being used by their subordinates. This may involve:

- (1) Personal responsibility, as in the case of equipment issued to an individual for his own use and habitually under his own care; or

- (2) Supervisory responsibility, as in the case of a platoon, section, or squad leader with respect to the equipment pertaining to his command.

b. Echelons of Maintenance. Over the years the Army has evolved echelons of maintenance where repairs of ascending complexity are performed. These maintenance levels have been fixed in five broad echelons. For practical purposes, however, the five echelons have been combined into a three-category structure, in which the first and second echelons are now referred to as organizational maintenance, the third and fourth echelons as field maintenance and the fifth echelon as depot maintenance. Experience has taught the Army that it is essential to control the type of maintenance work performed at each echelon in order to prevent attempts at repairs by personnel who lack either the necessary skills or tools. Lower echelons can occasionally manage to get a deadlined unit operating by performing nonauthorized work or cannibalizing parts from other equipment. Even when the unauthorized repair is successful, however, the bypassing of the higher echelon may involve failure to recognize structural weaknesses and lead to total breakdown of the equipment. Yet common sense may sometimes dictate the use of any unusual skills that may be present at a lower echelon, particularly in the case of emergencies.

- (1) *Organizational maintenance.* Organizational maintenance is that maintenance which is authorized for, performed by and the responsibility of a using organization on its own equipment. This maintenance consists normally of inspecting, cleaning, servicing, preserving, lubricating, and adjusting as required and also may consist of replacement of minor parts not requiring skills that are of a highly technical nature.

Despite their mundane nature, cleaning, oiling, inspecting and adjusting equipment probably constitute the most important forms of maintenance. If these duties are performed conscientiously, the burden on higher maintenance echelons is substantially re-

duced. Correction of minor operating difficulties before more serious troubles develop is the most economical maintenance that can be performed at any level. The value of training and discipline in the use and care of equipment is as important to the combat commander as the combat readiness of his troops. It is an inseparable part of overall combat readiness; tank battalions without operable tanks and infantry units without reliable radios are not ready for combat. The importance of frequent inspections of equipment by commanders at all levels cannot be overemphasized, nor can the need for disciplinary action against those who fail to care for equipment properly. Poor equipment and poor morale go hand in hand and should be considered in command inspections to be of equal importance.

- (2) *Field maintenance.* The bulk of field maintenance in the continental United States is performed by fixed shops, predominantly civilian operated, under the Army commander; some field maintenance in the continental United States is performed by special, mobile repair activities assigned to the support of the using organizations. In oversea areas, the bulk of field maintenance is performed by mobile repair activities. Normally, equipment repaired by these field units is returned to the using organization. The present concepts provide for field maintenance and repair parts support from the same field organization.

Thus the purpose of field maintenance is to furnish close support of the equipment in the hands of using units. Field maintenance units usually serve either a specific area or specific troop organizations and, accordingly, are familiar with their customers and their needs. Frequent liaison visits and inspections of the equipment in the hands of the units it serves enables the field maintenance shop to have a firsthand acquaintance with

the condition of the equipment. Inspections of this kind can lead to a reduction of the number of serious breakdowns that arise from delays in making needed repairs.

Field maintenance may take several days, and using units are sometimes disinclined to go without their equipment during the repair period. Under some conditions substitute equipment may be made available. The problem is mitigated when repair teams can be sent to the equipment. Since the importance of the repairs to be made may far outweigh the temporary inconvenience of being without the equipment, the reluctance of using units to turn in equipment for repair is a problem which the commander must handle through training and discharge of command responsibilities.

- (3) *Depot maintenance.* Depot maintenance, formerly called base maintenance, is generally performed in fixed or semifixed installations. Such installations are capable of major overhaul, minor fabrication of parts and complete overhaul of subassemblies and end items. Overhaul assemblies and subassemblies are stored and issued in support of field maintenance activities. In the continental United States, depot maintenance is performed at technical service installations under the chief of the technical service. In oversea areas, depot maintenance is performed under the control of the theater commander. In contrast to field maintenance, repaired items are usually returned to stock rather than to the user.

Depot maintenance shops typically employ large numbers of personnel, in many cases predominantly civilian, and perform work on a production line basis. Their heavy machinery and machine tools limit their mobility. Usually they are located considerably to the rear of troops in an active theater and, accordingly, the equipment to be re-

paired must be transported to the shops. Because of the time required for transportation and to make the necessary repairs, equipment turned in to depot maintenance shops normally must be replaced by substitute equipment, with the repaired items being returned to stock.

Because depot shops perform major overhauls requiring a wide range of parts, it is essential that repair schedules be formulated many months in advance in order to insure the availability of needed parts, subassemblies and assemblies.

4. Scheduling Maintenance

The performance of maintenance and repair work requires close scheduling in order to avoid the overloading of facilities, to keep at a minimum the time in which active equipment is out of service and to assure that repairs are made when necessary. In the following sections, questions relating to workloads, material requirements, and schedules are discussed.

a. Determining the Workload. To schedule maintenance, it is necessary to know what needs to be repaired, when it must be repaired and the resources necessary to make the repairs. In other words, the workload must be determined and then related to the facilities, funds and personnel available.

At the organizational level, where maintenance consists largely of inspection and servicing, scheduling can be based on fixed time periods or fixed miles or hours of use. Command inspections can assure that equipment is checked periodically, serviced according to fixed schedules and maintained in a state of readiness.

At the field maintenance level density of equipment plus constant liaison with the using units will provide an indication of the impending workload.

At the depot level, determining the workload is somewhat more difficult. Much useful information can be obtained by depot shop personnel through field inspection of equipment and liaison with field maintenance units. The broad

rebuild and modification programs carried on at continental United States depot shops generally must be scheduled at least a year and sometimes as much as three years in advance. This long period of time is required to schedule the return of equipment from overseas and continental United States locations and to assemble needed parts and equipment. Scheduling of this kind is accomplished at technical service headquarters, in coordination with commanders of continental United States and oversea commands. In certain instances, the technical service headquarters and the unit commanders may agree to have part of the modification program assigned to field maintenance facilities. Generally speaking, the technical service assigns to the depot shop a workload for a year in advance, leaving it to the depot to establish the month-by-month schedules.

One important control of depot maintenance scheduling that has yet to be fully achieved is the measurement of stocks awaiting repair and in the process of repair against stocks actually in use. What is the minimum number of jeeps, for instance, that should be in the depot repair shop or waiting for repair at any given time in order to maintain 100 jeeps in the field at all times? This would in effect measure the optimum "turnaround time" for major overhaul and repair work. Such a figure is difficult to arrive at because unserviceable items are turned in to stations or oversea bases and new items identified as replacement demand are issued to replenish the unit's supply. Particularly when major overhaul and rebuild scheduling is projected over a long period in the future, these unserviceable items may then be carried in station or depot stocks for a considerable time before being called in for repair. This turnaround time for major overhaul becomes excessive when it is necessary to purchase new equipment needed to supply regular demand which could have been met by rebuilding unserviceable stocks. Development of standards for turnaround time in major overhaul work may have a value far exceeding the cost of their application.

b. Materiel Requirements. The maintenance facility, whether field or depot, must compute the requirements for materials and parts to

accomplish the phased repair schedule. Two factors make this process inexact, at best; it is not always possible by initial examination of a piece of equipment to detect all the parts that will require replacement; nor is it always possible to obtain the required parts when they are needed. The problem is complicated by virtue of the impossibility of completely disassembling a piece of equipment in the field to determine its condition and the extent of wear. The inspector must rely on training and experience in estimating the degree to which parts he cannot see must be replaced. He may estimate high or low, and the accuracy of his estimate will not be known until the machine is disassembled just prior to repair. Based upon the inspector's estimates, the maintenance shop consolidates the probable requirements for parts and submits a requisition on the appropriate source of supply.

In a field maintenance facility, maintenance is normally limited to the repair or replacement of unserviceable parts, subassemblies or assemblies. Where it is determined that a repair part or parts will not be available in a given length of time the item to be repaired is normally evacuated to a higher echelon and the using unit issued a replacement item. This procedure reduces the possibility of collecting a large quantity of unserviceable items awaiting repair parts. This procedure is necessary in the field to insure mobility of the field maintenance unit.

At depot maintenance level after submission of parts requirements, certain items may be shipped immediately, some extracted to another depot, some placed on backorder and some sent to procurement. The shop must then test its schedule against the anticipated availability of the parts. Parts not available in the system and requiring long lead times for procurement can sometimes be fabricated in the shop. Substitutions are often possible. If neither of these courses is possible, the schedules must be revised in accordance with the availability of parts.

c. Adjusting Maintenance Schedules. At the depot maintenance level after schedules have been adjusted to conform to the availability of the parts initially calculated, the schedules may

have to be revised once again when the equipment to be repaired starts through the assembly line and latent defects are discovered that require additional parts. The problem here, from a parts supply standpoint, is a particularly difficult one. Depot maintenance facilities engaged in overhaul and repair operations, such as a company that overhauls aircraft engines, face this problem from day to day. Inasmuch as each engine has undergone a somewhat different experience, it is difficult to know what parts need to be replaced until the engine has been torn down. One engine may need a new carburetor part and another may not. With this in mind, how many of the carburetor parts should be kept in stock? It should have enough parts in stock to meet the needs of the overhaul line and thus avoid costly line stoppages. On the other hand, it must avoid overstocking of carburetor parts beyond foreseeable needs because of the various costs associated with maintaining an inventory that is larger than necessary. More than one maintenance shop engaged in work of this kind has found at least a partial solution to the problem through the economical order quantity formula which is discussed in some detail in chapter 4.

When equipment scheduled for repair is torn down, it may turn out to be in worse condition than had been anticipated with repair no longer an economical solution. Similarly, it may be found that a number of machines may be repaired by cannibalizing one or more of the machines most in need of repair. Higher priority jobs may be assigned to the shop, requiring alterations in the schedule of equipment previously assigned for repair. All these factors suggest that maintenance schedules must be flexible in order to permit the maintenance shop to revise its program in accordance with new information. Unless the schedule provides this flexibility, personnel and tools may stand idle while waiting for parts, or parts may be expensively fabricated that can be more economically procured from the manufacturer. Incidentally, these necessary alterations in maintenance schedules suggest some of the problems that the inventory manager at the stock control point faces in keeping informed of returns to stock from repair activities.

5. Economy of Maintenance

a. Introduction. The need for cost data to facilitate management decisions is particularly necessary in maintenance work. Many of the most basic decisions cannot be reached with any degree of confidence in their validity in the absence of such data. *For example*, unless it is known with some accuracy what it costs to repair an item, it is hard to decide whether the item is worth repairing. If the cost of making the same repairs at different installations is not known, it is difficult to appraise the relative efficiencies of the installations or to increase the performance of any one installation. If two installations repair the same defect at different costs, the disparity may result from differing overhead rates, more expensive labor costs, more costly materials and other factors; yet, without a breakdown of these costs, the particular factor or factors cannot be isolated. The costs in manpower, material and facilities to accomplish a given maintenance load must also be known in order to compute budget requirements.

The cost of maintenance work in Army shops should also be known in order to appraise the desirability, where possible, of employing commercial maintenance contractors. Are costs in Army shops higher or lower than the going commercial rate? As discussed earlier in this chapter, the decision as to whether the Army or commercial sources should maintain equipment cannot be made upon the basis of costs alone; the need for a training base mobility and close troop support may preclude the use of a commercial source in any given situation. But all other things being equal, the Army should not maintain equipment which can be maintained more economically by commercial sources; this "make or buy" decision which is common to business operations of all kinds, in the Army and in industry, cannot be reached usefully without comparative cost data.

Cost data are also necessary in making decisions with respect to the equipment itself. *For example*, are the costs of maintaining an older piece of equipment mounting to the point where it is no longer economical to maintain it? Or, are maintenance costs of a given piece of equipment

so high as to suggest misuse or abuse of the equipment?

For these several reasons, it is essential that the Army have reliable data on maintenance costs. The accumulation of the basic cost elements is discussed in the following paragraphs. The section is concluded with a listing of some of the criteria for determining whether repair is an economical course of action.

b. Accumulating Cost Data. The usual method of accumulating costs in maintenance activities is to assign a job number to each unit of work. Direct charges for labor and material are recorded against the job number. The mechanics record the hours worked on each part of the job, and material is charged as it is withdrawn from the shop storeroom, or credited when returned unused. Where bulk quantities of material such as solder, lubricants, paint and preserving materials are withdrawn for several jobs, costs are prorated to the several job orders. At the end of the job, the direct costs for labor and material are computed and overhead costs are charged against each job usually in accordance with the direct labor hours. The overhead costs, representing indirect charges, bear a relationship to direct labor costs and are often expressed as a percentage of direct labor. *For example*, a given shop may have an overhead rate of 75% ; thus, for each dollar of direct labor assigned to the job order, an additional charge of \$0.75 is made to cover the job's share of indirect costs.

Whereas direct labor and material costs can be easily obtained, it is somewhat more difficult, under present financial arrangements, to determine an accurate or realistic allocation for overhead and other indirect expenses. *For example*, should depreciation of maintenance facilities be considered in costing work at a maintenance activity and, if so, at what rate? What should the charge be for repair of roads, ground upkeep, security measures, pensions and other indirect items of expense? Inasmuch as a maintenance shop is seldom, if ever, a separate activity but rather a part of a larger Army installation, the shop must bear a fair share of the installation's total indirect costs. Unless proper indirect charges are included in the cost of maintenance, a comparison with the cost of similar work in industry cannot be made. Moreover, failure to

include indirect costs may lead to decisions to repair equipment that would be uneconomical to repair if all costs were considered.

The gathering of cost data is also important as a means of controlling costs. Someone has said that cost consciousness is impossible unless costs are known. Only by means of historical cost data for each aspect of the repair work can management pinpoint areas where costs are rising and take appropriate action.

But cost control of repair work is ineffectual unless it embraces the total situation. One example will serve to illustrate this point. At a certain Army maintenance activity, higher authority had assigned a schedule of so many jeeps to be overhauled per month. The schedule was useful in controlling direct labor time; in effect, direct labor time had to be kept at a minimum if the schedule was to be met. The parts necessary to overhaul the jeeps were not similarly controlled. The manager of the shop could draw as many jeep parts, *for example*, as he wished. When a part on a jeep needed replacement, it was removed and a new part installed. This practice went on despite the fact that the activity had on hand a large supply of jeep parts in various states of disrepair. Many of these parts could be rehabilitated in a matter of only a few minutes. Despite this, new parts were always drawn from supply at a cost far greater than the cost of rehabilitating an old one. The practice persisted because the cost controls were limited; the control of direct labor time was accompanied by a free issue of supplies with the result that the total cost of the overhaul work was greater than it needed to be.

c. Criteria for Determining if Repair Is Economical. At what point in the age, service, or condition of a piece of equipment is repair no longer economical? In civilian life, *for example*, an automobile is used, repaired, turned in on a new model and passed down the economic scale of ownership until it is finally so unreliable that it is junked. The Army, where practicable, strives to move its equipment down the scale from combat to noncombat, from overseas to the continental United States and from tactical use to training. But even where it is possible to move the equipment into the hands of less exacting users, a point is finally reached where the

cost of maintenance is so high, the equipment so unreliable, the time out of commission so long, the machine so much less effective than newer models that further maintenance is no longer economical. This question of when to junk the equipment is a matter of both straight economics and such miscellaneous variables as the strategic importance of equipment, the lead time to replace it, the availability of funds to replace it, the need for the equipment in training and other considerations. In chapter 8, on the disposal of stocks in excess of needs, the same type of problem will be discussed in connection with retention levels.

The technical services have developed methods to assist them in determining when repair is no longer economical. The Corps of Engineers "point system" is one approach to the question. Under this system, points are assigned for factors such as repair parts support, age, hours of operation, cost to repair, and utility after repair. Each factor is given a point score; *for example*, one-half point is given for each year of the equipment's age, one point is assigned for each thousand hours of operation and so forth. A score of eleven is arbitrarily determined to be the point beyond which repair is no longer economical, barring such overriding considerations as military necessity or the impossibility of replacement.

No single set of criteria will cover all aspects of the question of whether to repair or dispose of the equipment, nor will it provide a necessarily automatic answer. A few of the factors that may be governing in any given instance are:

- (1) Age of the equipment. (The equipment's age has a direct bearing on the amount of deterioration, the probable usefulness of the older machine as opposed to later models and repair parts support from the manufacturer.)
- (2) Availability of repair parts already in the system.
- (3) Cost to replace.
- (4) Time to replace.
- (5) Present salvage or resale value and rate of annual depreciation.

- (6) Cost to repair.
- (7) Percentage of utility after repair contrasted to newer models that might not be procured.
- (8) Cost to maintain after repair as opposed to the cost to maintain a new piece of equipment.
- (9) Amount of time expected to be lost through present and future repairs.
- (10) Cost of transportation of the item from where it is to where it is needed, as opposed to the cost of moving a new item from the manufacturer to where it will be needed.
- (11) Cost to store and preserve an item not needed until the time when it is needed.
- (12) Eligibility of equipment for modification into a more useful machine as related to the cost of modification.
- (13) Burden on the supply system of maintaining parts support for more makes and models of equipment.

6. Summary

As the Army becomes more and more mechanized, maintenance takes on increasing importance. The prospects of either a long cold war, which strains the national economy, or an all-out war with probable shortages of manpower and materials, also add new importance to the maintenance function. Commercial facilities and experts from the manufacturer should be used to the maximum extent possible in the maintenance program, but their use must be tempered by the necessity of having Army facilities and personnel available to follow the troops. The greatest single means of preventing an excessive maintenance load is the elimination of unnecessary damage to equipment by misuse or failure to take preventive measures at the using level. Of substantial importance, from a management standpoint, is the economics of maintenance—the cost of maintaining old and obsolete equipment as opposed to replacement by more modern equipment costing, at least in the initial periods, less to maintain.

C. REPAIR PARTS

1. Introduction

It is apparent from the preceding discussion in this chapter that the maintenance and repair parts support are closely linked; unless the spares are readily available, maintenance schedules cannot be met. In this section of the chapter, various aspects of the parts problem will be examined in some detail; the chapter will discuss the procurement of initial repair parts, their distribution throughout the system, the computation of parts requirements and the procurement of replacement parts. Thus, to some extent, the organization of this section of the chapter follows the organization of the manual itself. While many of the principles and observations discussed in preceding chapters on storage and distribution, requirements and procurement are applicable to parts as well as to end items, the magnitude and complexities of the repair parts problem require separate treatment here. The complexity of the problem has already been suggested in chapter 6 on cataloging in connection with the question of identifying parts.

2. Magnitude of Repair Parts Problem

a. Background of Problem. The magnitude of the repair parts problem has its origin in the policy that maintenance support should be an integral part of the organization of the Army. This policy was an outgrowth of the maintenance and repair parts situation in World War I. World War I planning was based on the concept that every part might fail and, therefore, that every part for every item should be stocked. It was planned to ship 445,000 different parts overseas, and in fact about 88,000 parts were actually shipped, of which only a small fraction was actually used. There were neither catalogs nor allowance lists and, except for a few factory representatives, only limited skilled personnel. Failure to care for the parts actually shipped resulted in rust and deterioration. Many of the parts were not interchangeable, and there were few attempts to standardize vehicles and engines before the end of hostilities.

Between the two world wars a family of trucks providing for the interchangeability of engines was developed by the Quartermaster

General. Because of the military austerity of this era, few of the vehicles were actually produced. During this period, however, manufacturers and Government agencies made some progress in designing and producing standard parts and common hardware. Common threads, uniform bore sizes and uniform strokes were adopted. Accessory businesses grew up and interchangeability of assemblies and subassemblies became more common. During the mobilization for World War II, the World War I concepts of reliance on the manufacturer for maintenance support and the stockage of every part were abandoned. We entered World War II with the concept that essential repair parts would be stocked by the Army and maintenance support would be an integral part of the organization of the Army.

b. Repair Parts Currently Stocked. It has been estimated that from 80% to 90% of the items stocked in the system are repair parts of one form or another. At the end of calendar year 1955, the Army had on hand approximately 725,000 repair parts line items costing 4.07 billion dollars. These figures, impressive as they are, include only those parts normally stocked. Thousands of other parts with less frequent demand by users must also be procured when required. Moreover, the figures represent only a small part of all the parts that are required to repair all the equipment used by the Army.

The large number of repair parts currently stocked bears a direct relationship to the variety of end items stocked by the Army. As chapter 1 has indicated, there is no commercial parallel for the Army's materiel needs. The end item may be purely military, such as a tank, partially military such as an amphibious truck, or commercial, such as a typewriter. Many essentially commercial items must be modified somewhat to meet the needs of Army use. The same military item made by more than one manufacturer may show some differences. *For example*, the World War II jeep was obtained from both Willys and Ford, and the parts necessary to support the two manufacturers' models were not fully interchangeable. Moreover, modifications to an item resulting from improvements in the design of assemblies and components require different

parts support for the later serially numbered machines than for the earlier models. As a further complication, the improved part in the later model is often substituted for the earlier part when replacement is needed, creating major cross-referencing problems.

The wide range of end items stocked is only one of the reasons why so many repair parts must be carried; another important reason is the large number of makes and models of essentially similar equipment. *For example*, in 1953 in the Far Eastern Command there were some 127 makes and models of cranes supplied by 29 different manufacturers. This diversity of end items and its attendant burden of parts support is rooted in the nature of the American economy and the practice of formal advertising and competitive bidding which tends to characterize military procurement. More than one supplier is usually available to furnish an end item, and under competitive bidding, the lowest responsive bidder receives the award. Unless one manufacturer continually underbids his competitors, different makes and models of the required end item will enter the system and require the stocking of a different line of repair parts.

3. Procurement of Initial Repair Parts

a. Introduction. Repair parts are necessary to support maintenance and maintenance must be accomplished speedily in order to keep at a minimum the time that equipment is unavailable for issue and use. Thus, the required parts must be readily at hand.

The question that then arises to perplex the supply manager is: What parts will be required? In a broad way the question can be answered upon the basis of industrial and Army experience; it is not necessary to assume in repair parts planning that all parts will require replacement. The fact that only about 725,000 cataloged repair parts are stocked—large as that figure is—when the number of parts required to assemble all the Army's end items would run into several millions, reflects this experience. Certain parts never wear out during the useful life of the item, other parts can be repaired, and large body and frame pieces can be replaced when necessary through the practice of cannibalization. The Army, like the corner garage,

cannot afford to stock every part that may conceivably be needed; however, it must have on hand many of the parts for which there is a recurring demand.

Industrial experience in maintenance has revealed that the demand for repair parts is concentrated; from 15% to 20% of the parts account for from 80% to 85% of the total demand. The Ordnance Corps tested this theory in Korea under project 170 and it is currently the basis for stock selection under the Army Field Stock Control System. An automobile provides a useful illustration of this point. The brake bands, sparkplugs, distributor points, and fuel pump wear out fairly rapidly and must be replaced. The wheels, the cylinder block, the radiator and the frame members seldom require replacement except in the case of a wreck.

Knowing in advance which parts will require replacement constitutes a major problem for repair part management. For new items, there is little or no usage experience. For old items, the conditions of use in the future may vary from those in the past. If it were possible to wait until the demand for parts developed mortality rates, much of the guesswork as to what will wear out could be eliminated. But as in so many questions of this kind, the Army cannot afford to wait. In the first place, the Army cannot afford to have a machine deadlined during the time that the needed parts are being obtained. Secondly, even if time were not a factor, there would be cost considerations of substantial importance. These cost factors are particularly applicable with respect to purely military or partly military items. When a manufacturer makes the parts or components to assemble his end item, he can provide extra parts or components much less expensively than at a later date when his production lines are turning out different end items. The added costs would be accompanied by delays while the manufacturer attempted to shift his production schedules to allow for the production of the extra parts. These various factors require that some provision for parts support be accomplished at the time the end item is procured. This section of the chapter discusses some of the considerations involved in the procurement of initial repair parts; in a later section of the chapter the procurement of replacement parts will be discussed.

b. Initial Repair Parts for Commercial and Semicommercial End Items. When it is decided to add a new make or model of machine to the supply system, which parts should be selected for stockage and how far down the supply line will the stockage be maintained? Commercial items will be considered first because they present a slightly different problem from that encountered in selecting parts for military-type items. In the case of the commercial-type item some reliance must be placed on the manufacturer to advise the Army of the anticipated mortality rate of parts. But the manufacturer's advice must be weighed against the facts he does not know, as suggested by the following questions:

- (1) What will the item be used for and where will it be used? The answers to these questions may substantially affect the consumption of parts.
- (2) What common components, such as nuts, bolts, screws, washers, wire and other common hardware necessary to maintain the item are already in the supply system?
- (3) What assemblies, subassemblies and parts already in the system can be substituted for the manufacturer's assemblies, subassemblies and parts?
- (4) Which of the manufacturer's parts can be fabricated readily from tubing, hose, fittings, metal in basic shapes and gasket material?
- (5) Does the Army expect to maintain all of the items or to cannibalize some for major assemblies such as frame pieces, body pieces, housings and other such insurance-type items that might otherwise be stocked?
- (6) Which of the parts are likely not to be damaged beyond a point where repair cannot be accomplished by such processes as welding, metalizing and re-grinding?
- (7) Which of the parts are moving and nonmoving and therefore subject to more or less wear?
- (8) What experience has already been encountered in connection with similar parts in other items?
- (9) Shall the Army stock the whole assem-

bly, the subassembly or individual parts? This question is one of the most complicated ones to be answered. Some considerations that may be helpful in answering it are:

- (a) Is the assembly small, intricate and inexpensive (like a voltage regulator, *for example*) and usually replaced as an entire unit?
- (b) Are facilities and skills in the field available to repair the assembly or does it require the type of bench work available at the depot shop? If the latter, would it be more practicable to replace the entire assembly in the field by a new assembly and return the old assembly to the depot shop for rebuild?
- (c) Does the assembly contain only a few parts subject to rapid wear that are easily replaced in the field? An example of this type of repair is the carburetor repair kit which contains those parts of the carburetor which require replacement at frequent intervals.

The nine questions listed above suggest that the Army should be particularly "hardheaded" about stocking initial repair parts for commercial items. To do this safely, it is necessary for repair parts inventory managers to have broad commodity knowledge, particularly with respect to sources of supply and the business practices of the suppliers. For many commercial items, the supplier maintains parts for his customers, and it is clearly in the Army's interest to let him supply them rather than to carry them in the Army supply system. The purchase of replacement parts when needed under open end and call contracts is discussed in a later section of this chapter.

If it is possible to defer the purchase of repair parts until a later date, it is often advantageous for the Army to do so. Two generalizations would appear to grow out of the discussion: (1) Initial repair parts should not be procured if the Army can maintain the equipment through repair, cannibalization or by means of duplicate or similar parts already in the system; (2) Initial repair parts should not be procured if they are easily obtainable at a

later date or obtainable at lowest ultimate cost from the manufacturer. Two examples will illustrate these two generalizations.

First, the Army has often obtained large quantities of wheels as initial repair parts. Typically, a wheel does not need replacement as a result of wear; it usually must be replaced only as a result of an accident to the vehicle or battle damage. In either event, the vehicle itself may be so severely damaged that repair is no longer an economical solution. Thus, the wheels which have been purchased and stored at considerable expense may not be needed.

It is disadvantageous for the Army to obtain repair parts initially if they can be obtained at a later date at lowest ultimate cost from the manufacturer. *For example*, major subassemblies are sometimes purchased as initial parts when large stationary pumps are bought. The subassemblies may cost from one-fourth to one-half the price of the pump itself. In normal use, the subassembly would not have to be replaced until perhaps ten years had elapsed. At this point, the economies of the situation might make it cheaper to get rid of the entire pump rather than replace an expensive subassembly. If it were less expensive to replace the subassembly, it might be procured from the pump's manufacturer, since the pump is a commercial item that the manufacturer sells to his various customers. Meanwhile, the manufacturer, not the Army, would have borne the costs of maintaining the subassembly in storage and the cost of funds tied up in parts that had no immediate use.

c. Initial Repair Parts for Military Items. Many of the observations made with respect to commercial items apply as well to military items. Generally speaking, however, it is more necessary to acquire initial repair parts with military items than with commercial items. The reason for this is that the manufacturer normally produces his regular commercial line of merchandise and manufacturers military items only when called upon. At some later date, he may be reluctant, because of inconvenience and cost to divert his commercial production in order to manufacture needed parts. Fortunately, there is some opportunity with military items to determine parts mortality

through actual experience with the item. Military items are developed and produced upon a gradual basis that encompasses various stages:

- (1) Statement of the military characteristics;
- (2) Creation of concept studies and mock-ups;
- (3) Construction of pilot models;
- (4) Engineering tests of pilot models;
- (5) Service test of pilot models;
- (6) Construction of production prototypes;
- (7) Engineering and service tests of prototypes;
- (8) Limited production of new end item;
- (9) Troop tests of new end item.

Through these nine stages of development of a new end item, exhaustive tests are conducted in the laboratory and in the field to insure that the new item is the best possible one for the job it will be required to perform. During this testing and modification, information is acquired on the mortality of the end item and its components. The initial parts list established with the pilot model is refined as these tests proceed. Service tests lead to further modification in the parts list. During the development particular emphasis is placed upon "ease of maintenance" to make certain that defective parts may be reached and replaced easily. In the development process it is most important that standard parts, assemblies, and subassemblies already in the system be utilized to the maximum extent possible to avoid the unnecessary introduction of new parts in the system. Sometimes it is advantageous to furnish these standard parts to the manufacturer as Government-furnished property, with corresponding reductions in the manufacturer's price.

To provide uniformity in repair parts selection and maintenance capability determinations, maintenance allocation charts are prepared by heads of technical services. Charts are prepared for each group or family of similar major end items, and common component assemblies and subassemblies. These allocation charts show by general description the maintenance operations authorized to each echelon. Repair parts are selected from a list of all parts of a major end

item by determining which are required in maintenance operations. This is determined initially from applicable maintenance allocation charts of the specific end item and by maintenance evaluation of the specific major end item and its assemblies and components. Normally during maintenance evaluation a physical inspection, disassembly, and assembly of parts and components is made. The manufacturer's experience, engineering, *service and troop test* experience, and experience with other similar items are considered. Maintenance evaluation also determines for each maintenance echelon the most efficient form of repair parts to be used, i.e., individual pieces, bulk material, assemblies, sub-assemblies and kits of parts for specific repair operation.

Even with the information gained through research, development and testing, the Army sometimes acquires initial repair parts that experience proves to have been unnecessary. This is unavoidable because it is impossible to predict which parts will wear out and when.

4. Distribution of Repair Parts

a. *Initial Distribution of Parts.* In the preceding section we have discussed some of the many factors that must be taken into consideration in determining what parts will be stocked to maintain a new item. After the decision has been reached as to which parts will be stocked, the next question to be resolved is how many should be stocked where. If subsequent experience discloses that a part expected to fail does not fail, every extra part procured compounds the error. On the other hand, if the part fails at a more rapid rate than anticipated, stocks may be exhausted and machines deadlined before additional quantities can be procured.

The usual practice in determining the number of each part to be bought is to calculate the repair parts mortality. This is done by estimating the frequency of consumption or replacement in the applicable maintenance echelons for each part *under combat conditions* for the average climate and terrain. Allowance factors are determined for each repair part allocated to each maintenance echelon. The allowance factor is based on the latest mortality data and is the estimated average quantity required by the

various maintenance echelons to provide maintenance, and where applicable, supply support for 100 equipments for a 15-day period under combat conditions. Although the selection of the level at which an item will be stocked is of extreme importance, it should be borne in mind that what is here being discussed is the initial distribution of parts before there has been any accumulation of demand experience. At this stage in the introduction of a new item to the supply system, the maintenance technician can do little more than make an educated guess as to the probable consumption rate of parts.

It should be mentioned in passing that parts to support an end item are required to be in the theater by the time the new end item arrives. Often in practice, the objective is not achieved. The manufacturer is anxious to meet his delivery schedules for the end item and typically uses the first parts he fabricates for assembly of end items. Only after all or a large number of end items have been produced is the manufacturer conveniently able to furnish the parts required under his contract. This situation can be prevented only by careful followup by contract administration personnel.

b. *Publication of Parts Lists to Field.* When the parts that will be stocked have been selected and it has been determined where they will be stocked, it is necessary to publish lists of these parts to the depots, shops, and users.

Under present practices, types of supply manuals are published which show:

Type 7—organizational maintenance allowances;

Type 8—field and depot maintenance allowances;

Type 9—list of all service parts.

The organizations have used the type 7 manuals to order the parts and supplies they were authorized, while the maintenance shops and depots have used the type 8 manuals as a guide to initial stockage of parts and supplies in the absence of demand experience or known requirements. Type 7 and 8 manuals showed the number of spares to support a given number of end items for a fixed period. These manuals are being consolidated when economies and more efficient cataloging are gained without detract-

ing from the usability of each type manual. In the future, present Type 7, 8, and 9 Supply Manuals will be replaced on an attrition basis by new type technical manuals. The new technical manuals incorporate the concept of combining the present equipment technical manuals and present 7, 8, and 9 Parts List Type Supply Manuals into a single document, with separate parts for the various echelons of maintenance capable of being distributed on a need-to-know basis. The operators (part I) and organizational (part II) manuals will normally be published in separate books, but may be combined under certain conditions stated in AR 310-3 as changed; while field (parts III and IV) and depot (part V) maintenance manuals may be combined at the discretion of the heads of the technical services. This revolutionary change in concept removes all of the optional features of current type supply manuals and provides for firm parts listings item-wise and quantity-wise. Additional features include a standard size format for all technical services to permit binding of all publications in one binder, including the related Lubrication Orders (LOs) and Modification Work Orders (MWOs) pertaining to operation instructions and maintenance of a major end item or family of similar major end items. The parts lists of the new manuals which are subject to frequent changes may be bound separately and reproduced in loose leaf form to facilitate supply and maintenance operations. When new end items are initially distributed, or when there is a major shift in end item populations, these "echelon lists" are often used by the inventory control point to compute and make automatic shipments without requisition of the number of parts required to maintain the end items being shipped to users.

c. *Determining True Consumption Rates.* The discussion thus far has been limited to the initial selection and distribution of parts for new machines or other items of equipment entering the system. The decisions have been made largely upon the basis of estimates, and must be reappraised as experience with the new equipment is acquired. For various reasons, described below, the process of reappraisal is a complicated one, particularly with respect to overseas activities, and there are many factors that make it difficult to obtain true consumption

rates. One of the first problems is to ascertain the actual demand history of the parts.

- (1) *Issue history of parts.* Organizations, field maintenance shops, and depot shops all carry stocks of repair parts. Thus, there is usually a "cushion" between the actual demand for the part for a repair job and the reflection of the consumption of the part by a replenishment requisition on the depot. If the initial estimate of consumption was low, demands for additional parts may be reflected rather quickly; if the estimate was about right, additional demand is slower to be reflected at the depot.

"Automatic shipment" of parts and "automatic requisitions" also make it difficult to determine the issue history of parts. The automatic shipment of parts from the depot system has already been described. The "automatic requisition" is somewhat different. It occurs when a shop must repair an end item (not necessarily one of a new type) on which it has had no previous experience. Accordingly, the shop must rely upon the accuracy of the echelon list (which has been determined upon the basis of estimate, not experience) to provide the right parts in the right quantity for accomplishing the new maintenance workload. The parts that are acquired as a result of automatic shipments and requisitions begin to build up in the shops as well as in overseas depots, which are also supplied "automatically." In addition, the shops order parts they think they will need for repair jobs but for which no actual demand may develop. The shops and the overseas depots are reluctant to declare any ensuing overstockage of parts as excess. In a week or in a month, they may be needed and it is easier to take them off the shelf than to place a requisition through the supply system.

- (2) *"Layering" of repair parts support.* The stocks of parts that exist in the overseas depot, organization, field shop,

and depot shop represent only a portion of the total cushion. Posts, camps, and stations also have stocks. In overseas areas, the depot system may be in layers. *For example*, during and immediately after the Korean Conflict, repair parts for one technical service were distributed by a repair parts depot in Yokohama, a repair parts depot in Pusan (which derived some portion of its parts from Yokohama and received shipments directly from the continental United States) and a small depot maintained by the Eighth Army near the front (which drew parts either from Pusan or Yokohama). This "layering" of parts support is illustrated as follows:

Continental United States depot stocks.

In-transit overseas stocks

Yokohama stocks

Pusan stocks

Eighth Army stocks

Depot shop stocks

Field shop stocks

Organization stocks

In the technical service in question, field maintenance shops provided parts support to organizations. Thus, a demand for a part from an organization in the Eighth Army would normally have been reflected from the organization to the field maintenance shop, to the Eighth Army depot, to the Pusan depot, to the Yokohama depot and finally, to the depot in the continental United States. Since the demand on the supply system for parts originating at all of these levels stemmed in a large measure from the published echelon lists, it is readily apparent that the quantity of parts issued from the continental United States depot system may have borne little relationship to the quantity of parts actually consumed within the system. Of course, if enough time is provided for the demands to level out while the number and type of end items being supported remain constant, the continental United States depot system will

finally be able to determine the true consumption rate. However, by the time it is possible to determine whether the supply of a part is short or long, the basic maintenance workload is likely to have shifted so appreciably that the reflected demand bears little relationship to the current true demand. All of the intermediate cushions of stocks of the same repair part serve to dissipate the responsiveness of supply to demand.

- (3) *Attempted solutions.* The preceding discussion suggests that the sluggish reflection of true demand to the stock manager at the inventory control point may result inadvertently in the building up of an artificial demand for parts that may never be needed in the quantities supplied. Further, intermediate stockage of the same part at so many levels may build up reservoirs of parts that will become excess if there is a substantial change in the distribution of end items. On the other hand, we have seen that it is neither practicable nor desirable to ship parts over long distances only after actual demand has arisen. When the user has a deadlined end item, the Army cannot afford to wait until the parts are shipped. From these considerations it is clear that "automatic" supply cannot be eliminated. Nevertheless, there must be a means of correcting the echelon lists more promptly to prevent overstockage of unneeded parts.

The Army has recognized the seriousness of this problem and is attempting to solve it in several ways. One solution is the use of the Army Field Stock Control System, in which the maintenance organization reports the actual consumption of parts by a separate card each time a requisition is placed. These cards are then sorted by part number to ascertain the consumption of parts being carried at various levels. Studies of these consumption rates show that a relatively few parts represent a high percentage of the total true consump-

tion. The project has led to a large reduction in the repair parts loads carried by the organizations, the shops, and the depots. This approach, wherein the parts actually consumed are tabulated as opposed to counting the parts issued from the depot system should provide a means of correcting the echelon lists promptly enough to avoid the large accumulation of excesses that will otherwise result from overstated echelon lists or, conversely, to prevent shortages from understated lists. Although these efforts to determine true consumption at user level can do much to alleviate the general problem, the stockage at many intermediate levels, based upon carefully purged echelon lists, will nevertheless retain some sluggishness and will generate excesses in spite of the reduced echelon lists. One of the technical services has tackled the problem by providing standard containers in which the continental United States depot can ship parts directly to the oversea maintenance shop. In other words, the previous procedure of shipping to the oversea depot or depots which unpack, bin, and repack is eliminated. To take full advantage of the savings that can be effected by these direct shipments, it is necessary to reduce the administrative lead time in placing the requisitions on the continental United States depots.

5. Determining Requirements for Repair Parts

a. Introduction. The discussion of requirements computation in section B of chapter 4 is generally applicable to computing parts requirements. There are, however, important differentiating factors in the computation of parts requirements that the inventory manager must take into account. These factors include the need to:

- (1) Determine true demand;
- (2) Provide parts for a "mothball" force of end items in mobilization reserve;
- (3) Determine the present and planned geographic location of the end items to be supported;

- (4) Relate scheduled retirements and planned acquisition of new end items;
- (5) Relate repair, rebuild, and modification programs;
- (6) Relate assemblies to subassemblies or to the individual parts of which they are composed;
- (7) Relate substitutability or interchangeability of parts to computed requirements.

Each of these factors will be considered in succeeding paragraphs.

b. Determining True Demand. In discussing the distribution of repair parts, it was seen that the "automatic" supply of repair parts from echelon lists makes it difficult to ascertain true demand and leads to distortions in the issue history of depots. This same problem was discussed with respect to end items in chapter 3, wherein it was also pointed out that the distinction between initial and replacement issues was not always reliable. If the repair parts inventory manager cannot rely on issue experience as a true guide to demand, how can he test the validity of issues in computing requirements? Some of the other data that may be helpful to him are:

- (1) The quantity of the part used in all end items and the population of the end items that use the part.
- (2) The latest revisions upward or downward of the quantity of the part authorized on echelon lists. This information may indicate a previous over or understatement of requirements.
- (3) Future plans for augmentation or reduction of the end items that employ the part.
- (4) The extent of obsolescence of the end items that employ the part.
- (5) The population of end items in the mobilization reserve that employ the part.
- (6) The presence or absence of acceptable substitutes or interchangeable parts in the supply system.
- (7) Any distortion of the issues that may have resulted from unusually large "automatic" shipments.

c. Providing Parts for End Items in Mobiliza-

tion Reserve. The quantity of parts to be held for the support of end items included in the mobilization reserve must be added to the stocks required for end items currently in use. Should the parts be segregated and held with the end items they are to support? Should the quantity of parts held for end items in reserve be computed from the echelon lists? The probable answer to both questions is "no." It is a rare exception when some portion of the total quantity of an end item is not in use. Thus, current experience in the mortality of parts for those end items in use should be representative of the demand for parts for the end items that may later be withdrawn from storage. Stocks of parts may be rotated if there is no segregation of balances. Provision of parts for the end items in reserve can be accomplished by the addition of a percentage that takes into account the ratio of end items in use to those in storage. The base figure on which the percentage is added will then fluctuate in accordance with mortality rates of parts now being replaced and will tend to keep realistic the quantity of parts held for the end items in the mobilization reserve.

d. Population Density by Area. The repair parts inventory manager must be currently informed of the location of the equipment he is supporting with parts, together with any planned changes in density. He must know the distribution of the equipment, actual and planned, in order to determine where to ship parts from the manufacturer. He must know where the equipment is located and how it is being used in order to apply different mortality rates for variations in climate and use. If the equipment is in reserve, he must know where it is now located or where it is expected to be used in order that he can place stocks advantageously for the day when the equipment is withdrawn from reserve. Gathering these figures is easier said than done: a variety of slightly different models are in use both overseas and in the continental United States, in depot stock, in shop inventories, and in transit. The repair parts inventory manager should be provided with base figures of the total number of end items acquired by the Army and the total number of end items that have been disposed of in order for him to test the accuracy of his inventory. The reports of stocks in depots or held by the depots

for the depot shops are fairly reliable, except to the extent that the identification of makes and models fails to provide enough detail to distinguish between models that require different parts support.

Stocks in the hands of troops, both in the continental United States and overseas, stocks in post, camp, and station inventories and stocks in oversea depots of all principal and major secondary items are reported quarterly under the Army Stock Status Reporting System. Machine records units of The Adjutant General Corps consolidate these lists and submit them through command channels to the technical services and to the Deputy Chief of Staff for Logistics. Improvements are being made in these reports and aggressive action is being taken to rectify errors, to provide accurate, timely and complete data, particularly with respect to brackets of serially numbered end items which require different parts support.

e. Rebuild and Modification Programs. Rebuild and modification programs must be taken into consideration in computing requirements for repair parts, particularly in phasing deliveries. The depot shops and the field shops engaged in such programs must furnish to the inventory manager estimates of parts required by periods. These requirements must be consolidated and combined with other requirements.

f. Substitutions, Supersessions, and Interchangeability. In spite of the original research performed at the time a new end item is introduced into the supply system, additional parts will be found to be substitutable, old parts will be superseded by newer parts and further interchangeability of parts will be discovered. Also, it may be found that an assembly will be issued instead of the individual components or, conversely, that the components that wear out will be issued instead of the entire assembly. Or, it may be discovered that a part should not be procured because it can be fabricated easily from bulk materials. In any event, the inventory manager must be able to "transfer" the demand from the old item to the new, reflecting the added requirement in the quantity of the new item to be procured. He must know what use can be made of the old item. Should it be disposed of or issued until consumed? These same

problems face the inventory manager of end items but in only a fraction of the volume faced by the inventory manager of repair parts. Cross-reference data in these instances are as valuable to the inventory manager in his computation of requirements as they are at the issuing and using level, in view of the fact that funds may otherwise be expended for unneeded items. Because of procurement lead times, the data with respect to substitutions, supersessions and interchangeability should be furnished to the requirements personnel even before being disseminated to the field.

g. Unused Assets Returned to Stock. The tendency of "automatic" supply to build up stocks of unused parts both at the overseas depots and in the hands of shops and organizations has previously been discussed along with the natural reluctance of personnel at these levels to return unused stock to the depot system. However, unless these stocks are recredited to the stock record account and the issue history readjusted, issues are artificially inflated and further assets of the same unused parts will be acquired. The problem is double-barreled: the stocks must be recovered as assets and the previous demand rate adjusted to prevent further acquisitions.

What are the means of recovering the assets? Should detailed stock status reports be gathered from all levels at which the parts are stored? If this approach is followed, tremendous inventory lists must be compiled and reviewed at great cost. There also is a necessary lag in the compilation and review of such stock status reports. Because of these considerations, review and action on the spot by inspection teams is probably the most economical means of eliminating unused excesses of parts, just as depot liaison teams examine end item stock record accounts of stations. If the stock of a part is determined to be excessive, the inspection team must be prepared to answer whether or not the part is already excess in the depot system or is needed elsewhere, in order that an on-the-spot final determination can be made as to disposition. If the part is returned to the depot system, the stock will be picked up as "on hand" without complications. However, the issue history at depots is "closed" by periods of time because of the practical impossibility of relating the return

to stock to the original issue. Accordingly, the "established" rate of issue may appear sufficient to exhaust the increased assets more quickly than the true facts will support. To prevent this type of inflation of demand, the inventory manager must take account of all returns to stock in his computation of requirements.

6. Procurement of Replacement Parts

a. Introduction. In discussing the procurement of initial repair parts earlier in this chapter, it was pointed out that in many instances parts must be procured along with the end item not only to maintain the end item but to obtain the extra parts at a time when the manufacturer's production lines are tooled to make them. If the component parts can be manufactured more economically at this time, why not purchase enough parts to last for the life of the end item? There are several reasons why this course of action is seldom followed:

- (1) The science of estimating parts mortality is inexact at best.
- (2) It is impossible to prophesy the exact climatic conditions in which the end items will be used or the kind of use that will be made of them.
- (3) Later production models may incorporate improved parts instead of the parts that were provisioned.
- (4) The interest on the investment in sufficient parts to last for the life of the end item may exceed the additional cost of re-establishing the production lines.

If parts should not be provisioned for the entire life of the item, for how long a period should they be bought? There is no single answer to this question; depending upon the variables in the situation, an optimum period may be six months, a year or more. Some aspects of the problem which will help to provide an answer in individual cases would include the following:

- (1) Is the item a "one shot" production, or will the manufacturer continue to produce it for the Army or industry?
- (2) How quickly will the item be put to general use and require parts support?
- (3) Is the manufacturer well established and likely to be a continuing source of parts?

- (4) Which of the component parts require a long lead time for manufacture and which ones could be quickly replaced?

b. Sources of Replacement Parts. There are two sources of replacement parts: the manufacturer of the end item on which they are used, and the manufacturer's own sources of supply. The manufacturer of the end item will often fabricate many of the necessary parts, but in almost no case does he fabricate all the parts from which the final item is assembled. Many of the parts which he purchases from other suppliers are common to a number of end items. This matter was discussed in chapter 6 on cataloging in relation to the problem of identification.

Should these common parts be procured from the assembler of the end item or the manufacturer who supplies them to the end item assembler? Often, from the standpoint of computing requirements for a particular end item and in placing orders for parts, it is simpler to procure all the parts from one source of supply. On the other hand, procurement from the final assembler may result in the payment to the assembler of an additional markup on the parts he procures from outside sources. Moreover, there may be delays while the final assembler processes purchase orders on the source of the parts. In some instances, the Army has had no recourse but to buy common parts from the manufacturer of the end item. This has stemmed from agreements between the end item manufacturer and the parts supplier, wherein the parts supplier agrees to sell the parts the end item manufacturer uses only to the end item manufacturer. Fortunately for the Army, there have been few such agreements. As a general rule, it is probably advantageous to the government to buy common parts from their original source and not from the manufacturer of the end item.

Replacement parts fabricated by the end item manufacturer and peculiar to an item must of course be obtained from the end item manufacturer.

c. Reliance on Manufacturer. When it is necessary to procure replacement parts, should the Army stock the complete range of parts or rely upon the manufacturer and his normal parts distribution system to furnish parts when needed under open end or call contracts or by means of

local procurement? As mentioned earlier in this chapter, it is advantageous where possible, for the Army to rely upon commercial sources for repair parts rather than to invest the necessary money to buy and stock large quantities of them. Because of the costs of adding a new part to the supply system, it is desirable to keep the inventory as small as possible and concentrate management attention to those parts actually stocked.

If the Army is to rely upon manufacturers rather than to stock a complete range of repair parts, it must assure itself that each commercial source maintains adequate stocks on hand and has an adequate parts distribution system. More than one technical service has found that it could rely confidently upon the manufacturer's commercial distribution system to supply parts under open end or call contracts or through local procurement. The Ordnance Corps, *for example*, has maintained administrative vehicles by authorizing local procurement of required parts from the automobile dealers and parts suppliers who normally maintain similar automobiles in the hands of the civilian population. Open end contracts have been awarded to manufacturers of subassemblies and parts such as generators, starting motors, bearings, and rings where the manufacturers have national distribution systems already in operation for the supply of these components to industry and the public. The Transportation Corps has had similar success in maintaining locomotives and rolling stock of commercial design by the use of open end contracts with the manufacturer of the needed parts.

The reliance upon the manufacturer's parts distribution system for repair parts as needed may create temporary problems for all parties concerned. Under bulk central procurement from the manufacturer, separate scheduling of manufacture and delivery of the Army's needs can be planned by the manufacturer so that it will not intrude upon his normal commercial demands. If, on the other hand, requisitions are placed by the Army upon his distribution channels (automobile dealers or parts supply dealers, *for example*) the impact of the Army's demands, at least initially, may cause some dislocation. The manufacturer must ac-

quire experience to determine the extent of the Army's demands upon his local distribution outlets.

The following comments may be helpful in determining the extent to which the Army can rely upon open end, call or local procurement to obtain parts as needed from commercial channels of distribution:

- (1) Does the manufacturer have a national parts distribution network which will provide convenient distribution points to Army users of his equipment?
- (2) Is the equipment basically commercial and is the manufacturer engaged in the support of the equipment in the hands of industry and the public?
- (3) Is the equipment purely military and the manufacturer, accordingly, unlikely to carry component parts within his distribution network?
- (4) If the item is a mixture of commercial and military components, can the com-

mercial components be supplied by the manufacturer's regular distribution network?

- (5) To what extent must the equipment be maintained in oversea areas where the manufacturer has no distribution network?
- (6) To what extent should stocks be maintained above current demands for equipment held in mobilization reserve? If the equipment is withdrawn from the reserve and put into use, will the parts requirements be so large that the manufacturer cannot furnish them through his normal distribution network?
- (7) Even though the manufacturer may not have a distribution network, are most of the parts that he provides small enough to be conveniently sent by parcel post or air shipment from the home plant to Army users?

CHAPTER 8

DISPOSAL OF STOCKS IN EXCESS OF NEEDS

A. NEED FOR DISPOSAL

1. Introduction

A constant task facing the supply manager is to insure that the supply system is purged of stocks that are excess or surplus to needs. An inventory of stock that is larger than necessary to support using units is costly to maintain, as has been emphasized in earlier chapters. The additional costs include storage and warehouse costs, maintenance and preservation costs, and costs associated with deterioration and obsolescence. To these costs must be added the cost of selling the excess material at a price substantially below the original purchase price.

In considering the problem, it is useful to look at the factors which cause excess stocks to be generated. A major factor, of course, is that wars do not end on schedule; if it were possible to schedule victory to occur precisely as the last available round of ammunition is fired, the disposal of excesses would be a minor problem. The problem could also be reduced if it were possible to wear out all old items before new items were adopted and to eliminate entirely errors in judgment. But victory cannot be scheduled to exhaust the pipeline; the new item must sometimes be adopted before the old has been consumed and human judgment is fallible. Accordingly, the problem of excesses will continue as an inevitable consequence of war and a readiness for war. Despite the inevitability of the problem, effective supply management can reduce its magnitude.

2. Distinction Between "Excess" and "Surplus"

Before describing in greater detail some of the reasons why excesses develop, it is necessary to point out how the Army differentiates between "excess" and "surplus" stocks. In effect, stock that is excess does not become surplus until it is determined that there is no further requirement for it by all Federal agencies. Stock may be ex-

cess to a station, a technical service or to the Army, but it does not become surplus property until it has been ascertained that there is no need for the stock by any Federal agency. The process of determining whether excess stock, at a station *for example*, is surplus to the needs of the Federal Government is termed screening.

3. Causes of Excess Stocks

a. Excess From World War II. When World War II ended, the pipelines were full. Goods were in transit between manufacturers and depots, between depots and stations, between depots and ports, and between ports and oversea depots. Along the pipeline, warehouses, yards and dumps were full. When victory came, an Army of scores of divisions with billions of dollars' worth of equipment was suddenly reduced to an Army of a few scattered divisions requiring a fraction of that equipment. A considerable portion of the material had to be demilitarized and sold as scrap because it had little or no civilian demand and no peace-time utility. Other items with some apparent utility found their way into appropriate civilian surplus outlets.

b. "Cold" War and Korean Excesses. Before the flood of World War II excesses was fully released, the "cold war" started and the floodgates were closed. With the outbreak of hostilities in Korea, it became necessary to buy back some of the more critical items that had been released previously. Abandoned equipment was assembled from the islands of the Pacific and rehabilitated in Japanese workshops. Repair parts that had been retained from World War II stocks were insufficient in many instances for maintaining this obsolete and often rebuilt equipment; accordingly, newer equipment was purchased to replace older equipment ahead of the scheduled replacement rate. There was always the possibility that the Korean hostilities would be the prelude to

another general war. Thus, the "wraps" were taken off many development models, and newer weapons went into production. Although the nation had modern weapons and equipment when World War II ended, a period of only five or six years had been sufficient to outmode our tanks, anti-tank weapons, and many other items. When the fighting in Korea ended, this outmoded property became an even greater liability to the supply system. The problem was intensified by the amounts of other material bought for fear the Korean Conflict would spread.

c. Excesses From Obsolescence. Excesses arise from obsolescence of equipment and supplies irrespective of whether wars are "cold" or "hot." Improvements in design make tanks faster, harder hitting and less vulnerable. Improvements in tanks require improvements in antitank weapons. Improvement in weapons require improvements in shells and propellants. As planes fly higher and faster, the ground weapons to combat them must shoot farther and be aimed more quickly and accurately. And because the planes fly higher and faster, searchlights are no longer useful for aircraft illumination and must be utilized in other operations or disposed of. Obsolescence, moreover, is not limited to offensive and defensive weapons. Improvements in engines, traction, suspension and load-carrying ability make the truck of a half decade ago equally obsolete. The clothing for Arctic wear has been completely redesigned in order to provide greater warmth and less weight. The need for reduced weight has affected more than clothing; weight of electric motors and radio apparatus, to name only two types of items, has been drastically reduced by means of new methods of insulation and miniature components. A variety of new metals, plastics, antibiotics, chemicals and other products of the laboratories is resulting in modifications of older items and the introduction of new ones. There is no reason to believe that this constant influx of new or improved items will stop. If our superiority in arms and equipment is to be maintained, it cannot stop.

- (1) *Phasing in new material.* Continuous improvements in equipment require that inventories be kept as low as the situation will permit in order to avoid large excesses of stocks due to obsoles-

cence. The objective is difficult to achieve. Enough of the old item must be stocked for current needs, but not in quantities that preclude the economical introduction of new items. When the new item is developed, it must be decided whether to dispose of the old ones immediately or to permit them to wear out and be replaced gradually. The question involves both economic and strategic considerations. Does the new item justify the additional cost in manpower and materials? To what extent can the old item be utilized or its materials recovered? Is the new item of such strategic importance that economic factors can be largely disregarded? There is no neat answer that will fit all cases. The economic answer may not be the same as the strategic answer, and in any given situation it may be difficult to separate economic from strategic factors. If the answer is based principally on economic factors, the old item should be phased out gradually by issuing the old and buying appropriate quantities of the new. Tight controls must be established over the new item to prevent its general issue before the old item is exhausted. Moreover, the introduction of the new item must be coordinated with maintenance practices and schedules in order to prevent uneconomic repairs to obsolete equipment.

- (2) *Residual stocks.* The excess stocks that result from the introduction of new items must be disposed of as promptly as possible to free storage space and reduce the costs of preservation and storage. If the old item can be used for training purposes or for certain non-critical applications, policies for issue of the old item for specified purposes or to certain users should be established for agencies that can approve issues.

d. Excesses From Failure of Supply Controls. Excesses will develop from the failure of supply controls governing the computation of requirements, procurement, and distribution. If in the

computation of requirements, there have been errors in estimated rates of consumption or of demand, excesses will develop. After procurement is initiated, changes in the basis of issue, in troop disposition and composition and other causes will generate excesses because of the various difficulties associated with attempting to stop production that is already under way. Some of these same factors, as well as the exercise of local command prerogatives in the selection of items to be used, lead to the accumulation of excesses at particular locations.

4. Cost of Carrying Excess Stocks

The excess stocks that arise from the several factors already described must be eliminated from the system. Excess stocks take up warehouse space that may be required for needed items, add unnecessarily to the costs of manpower and materials required for care and preservation and lessen recoverable value as a result of both deterioration and obsolescence. Failure to dispose of excesses can result in the use of unprotected outside storage for needed items and the inside storage of excesses. The costs of main-

taining stock record accounts of excess material and the associated costs of taking inventory and reporting excesses can reach substantial sums. Overhead costs of the installation for administration, utilities, care, inspection, preservation, maintenance of facilities and so forth bear a direct ratio to the amount of materiel stored, whether the materiel is needed or excess to needs. Rubber products, chemicals, certain drugs and many other items deteriorate rapidly in storage and cease after some period of time to have any substantial value. Even though items may not deteriorate physically, they deteriorate in usefulness through the passage of time as obsolescence takes its toll. An examination of the vehicles, fabrics and radio apparatus of a mere half decade ago illustrates how rapidly obsolescence antiquates materiel.

The substantial costs associated with stocks that are excess to needs makes disposal action a necessity. In section D of this chapter, alternative disposal actions are discussed in some detail. Before considering these various methods of disposal, it is necessary first to discuss the review of excesses at both the station and the depot level.

B. INSTALLATION EXCESSES

1. Screening Process

All quantities of serviceable items which are in excess of the authorized allowances for continental United States installations are considered as installation excess. Property determined to be installation excess property is reported to the distribution depot serving the installation. Once reported, installation excess property becomes subject to control of the depot and will not be issued by the installation except by authority of the depot or, in emergency, upon prompt notification to the depot of the action taken and the justification therefor. Oversea excesses are screened within the overseas commands and then forwarded directly to the technical service supply control point. The technical services also maintain current lists of specific items to be reported for possible return to the United States rather than disposed of overseas. Oversea excesses are screened by the Materiel Redistribution Division of the Department of the Navy for Department of Defense requirements.

2. Review by Depot

The depot, upon receipt of the report by the station, screens the items entered thereon and notifies the installation of the action taken. This notification may include any or all of the following instructions:

- a. Directions to ship to a depot or another installation.
- b. Directions to store at the installation under depot accountability.
- c. Directions to process as technical service excess.

3. Reporting Procedure

The report containing residual items of technical service excess property at installations and activities other than branch depots, technical service supply sections at general depots and overseas commands is forwarded by the depot to the appropriate technical service supply control point. The stock control point screens reports received against known or projected requirements

and issues appropriate instructions for those items that are required to remain within the supply system. Those items which are no longer required by the technical service and which are of high monetary value, critical or strategic in nature, or have wide use, are reported to the Materiel Redistribution Division for further screening for possible requirement by other Government agencies or services. Items not meeting these criteria are nonreportable and are disposed of by the owning service. CONUS depots report direct to the Materiel Redistribution Division while overseas commands report to the supply control point.

4. Screening of Excess Property

The Materiel Redistribution Division circular-

izes listings of excess property in which heads of technical services have expressed an interest. Orders for property contained on excess listings are sent direct to the Materiel Redistribution Division. Screening among Federal agencies other than Department of Defense activities is accomplished by the regional office of Federal Supply Service, General Services Administration, upon receipt of annotated reports of excess personal property from the Materiel Redistribution Division. Property which has not been redistributed, transferred, or donated is turned over to a property disposal officer for appropriate action. Any legitimate request received is honored, provided the property which has been screened is still available and has not been advertised for sale.

C. DEPOT EXCESSES

1. Introduction

Some of the considerations already mentioned in connection with station excesses apply equally to depot excesses. Moreover, the description of the screening process included the screening of depot excesses. The question of whether excesses will be retained at a particular depot has been discussed in some detail in chapter 3 of this manual with respect to depot transfers. The discussion which follows is limited to national retention of excess stock without regard to the particular depot in which the excess might occur. Again, the determination of appropriate quantities for national retention or disposal, according to the criteria discussed in this section, can best be accomplished by the national stock control point or, under the concepts discussed in chapter 3, by the commodity center.

2. Retention Levels at Depots

a. Elements of the Levels. There is a strong disinclination among human beings to throw anything away. Crowded attics and basements, as well as Fibber McGee's closet, attest to this human urge to keep everything that may eventually be needed. The Army is a collection of individuals with the same urge. An individual can retain everything he ever acquired at much less expense than the Army. An individual has available the attic, the basement, and the closet, and the cost of keeping only appears when an indi-

vidual decides to move. In the Army, on the other hand, storing goods is an expensive business of maintaining dozens of depots, employing thousands of people and spending vast sums of money to preserve and maintain the material. Personnel, money and materials that are needed for new things are tied up in old things or in quantities beyond foreseeable needs.

Despite these adverse cost factors, there are cost factors of a different nature that suggest the retention of excess items. If the item already on hand costs today what it cost originally, or less for that matter, the additional costs of procuring it, moving it to a depot, "packaging" it for storage and establishing records would make the replacement item much more expensive. Moreover, the excess item can generally be sold for only a fraction of the original acquisition cost or the current replacement cost. Further, repair parts to maintain the old item may already be in stock and would have to be disposed of at a substantial loss when a replacement item was obtained.

In view of these considerations, the establishment of adequate retention levels is an important task of supply management. Like the operating and other levels discussed in chapter 3, the retention level is first expressed in months or years of supply, and indicates the amount of supply beyond which disposal of stock becomes necessary. Some of the factors that must be kept in mind in establishing retention levels are:

- (1) How long will the stock last at the calculated rate of consumption, or how many months or years of supply are on hand?
- (2) What is the rate of obsolescence? Can the item be maintained with parts? Will it be outmoded before the stock on hand is consumed?
- (3) What is the rate of deterioration? Will the stock have lost its usefulness for the purpose intended before all of the stock is consumed?
- (4) What is the probable recovery from sale or salvage now?
- (5) What does it cost per month or year in facilities, manpower and materials to store the item?
- (6) At what point in the storage life of the item does the total of the present recovery value plus the costs of storage equal replacement value?
- (7) What quantity of the item *must* be on hand in the event of war to last until new production, including lead time, can replace losses?
- (8) What effect will retention of the excess quantity or obsolete item have on future acquisition of more modern equipment?
- (9) Will the excess be consumed where the stock is now? Can the excess be economically moved to other customers?

b. Interrelationship of Elements of the Retention Level. All of the elements that must be considered in establishing the retention level for an item are so interrelated that it is difficult to

establish the weights that should be assigned to each. Certainly, the weights accorded to each element must be varied by commodity. *For example*, the rate of obsolescence of hand tools is low compared to motor vehicles. Deterioration of fabrics is much more rapid than of hardware. The probable recovery from sale or salvage of tools will probably be greater than the recovery from military radio apparatus. In vehicles and machinery generally, obsolescence sets in the day the machine comes off the assembly line. The older the item, the more difficult becomes repair parts support. Newer machines are likely to do the job better with fewer men operating them. Thus, it may be economic to store a machine for long periods of time if only the cost of storage is considered, but uneconomic if the rate of obsolescence overtakes the storage life.

The condition of property as to serviceability and the costs of repair in relation to replacement costs must be considered in establishing retention levels. The determination of whether an item is economically repairable for purposes of retention is essentially the same determination as whether to repair for further use. The problem is the same as the one the maintenance manager faces: What are the assets of machines in good repair as opposed to machines in need of repair? Clearly, there is no need to keep machines that require repair when there are ample stocks of new and repaired machines. This aspect of maintenance economy was discussed in chapter 7, on maintenance and repair parts.

The many factors that determine the desirability of retention or disposal should be weighted by commodity areas to determine at what level of oversupply disposal should be made.

D. DISPOSAL OF EXCESS AND SURPLUS MATERIAL

1. Introduction

When material is clearly excess or surplus to needs, it should be disposed of to conserve warehouse space and reduce operating costs. Several types of disposal action are available. In many cases the type of material controls the type of disposition. *For example*, scrap and salvage narcotics and distinctive articles of uniform must be disposed of differently from civilian-type items. Military-type items such as guns,

tanks, and flamethrowers must be demilitarized before passing into civilian control. Classified material must be destroyed or so converted as to be unrecognizable before disposal. Some of the alternative disposal actions are discussed in the paragraphs which follow.

2. Disposal by Transfer to Other Government Agencies

Excesses in one technical service, one military department or one Government agency should

not, in general, be disposed of if the material is required elsewhere in the Government service, unless the cost of repairs plus the cost of transportation to the place where needed exceeds the cost of procurement.

3. Disposal by Donation

Surplus property may be donated to service schools, educational and public health institutions, veterans' organizations, museums, state and local governments, and certain other organizations. The intent of the Congress in this regard was to donate government surplus property to state educational and public health institutions in preference to sale of the property at some fraction of its original cost. Such institutions have been rather active in acquiring property under the law, particularly with respect to the more desirable small quantities of property in good condition.

4. Disposal by Sale

a. General. Programs are being developed and stressed within the Army with the goal of obtaining higher returns on sales of Government surplus property by improving the merchandising aspects of sales offerings. Items for which there is wide civilian demand are disposed of rapidly with a high rate of return to the Government. Items which are for the most part "military-type" items tax the initiative and the originality of the individual disposal officer as well as require him to apply sound merchandising and advertising practices and principles, to insure that the Government gets a fair return. The object of property disposal is not just to dispose of property no longer needed but to dispose of this property for as high a return as possible. Recognized civilian experts in the field of retail merchandising are being utilized to improve the Army's merchandising practices.

b. Lotting. Grouping of items into salable lots is the first step in disposal by sale. Various questions need to be considered. Should all the accumulated items be sold as a single miscellaneous lot? Or should the items be grouped into more than one lot and, if so, upon what basis? If the lots are small, a large number of

small bidders may be attracted and the return to the Government may be higher. But the costs of sorting the items and preparing invitations to bid, abstracts of bids and sales documents would also be higher and would tend to offset the higher prices obtained. Conversely, if the lots are too large and consist of widely different kinds of material, fewer bidders may be interested and prices obtained may be lower. Vehicles, typewriters, office machines, and other such items that are attractive to smaller buyers can generally be sold to the advantage of the Government under terms whereby the bidder must bid separately on each item. It is difficult to establish one set of rules to cover the many kinds of surplus property sold to local markets. The local disposal officer must carefully analyze the results of various sales to determine what kinds of lots bring the best return to the government in his geographical area.

c. Types of Sales. Surplus property may be sold through competitive bid sales (sealed, spot, or auction), negotiated sales and retail sales. Competitive bid sales are generally the safest method, but there are a few instances in which other methods can or should be used. *For example*, perishables may have to be sold more quickly than the formalities of invitation, bid and acceptance will permit. Spot bid sales, auction and retail sales may be used and often result in greater returns to the Government.

5. Abandonment, Destruction, and Demilitarization

When the cost of removal of property to a place where it may be sold is prohibitive and sale in place cannot be made, the most economical method of disposal may be abandonment. Of course, if the property is dangerous to public safety and health, destruction is the only recourse. Dangerous military-type items that may fall into the hands of the enemy or the unscrupulous must first be demilitarized or rendered useless as weapons of war. Components, assemblies, accessories, and parts of such items can be removed, demilitarized and sold separately when the probable recovery by sale will exceed the cost of disassembly.

E. CONCLUSION

The problem of stock which is surplus to foreseeable needs is only partly solved through effective methods of disposal. The problem can best be attacked by directing attention to the causes of excess stock. As this chapter has indicated, the accumulation of excesses is an inevitable accompaniment to wars and readiness for war. If for no other reason, the constant pressure for improved items of military equipment will create excesses for eventual disposal.

In many instances, however, it is necessary for the Army to dispose of quantities of commercial-type items. Here again, readiness for

war or the sudden ending of a conflict at a time when the pipelines are full is largely responsible for the accumulation of excesses. But with items of this secondary nature, there is a particularly good opportunity, through good management of supply operations, to avoid the overbuilding of inventories. Items of this kind are usually available through normal commercial channels of supply on a relatively short lead time. Close study of supply and demand experience, and the use of open end and call contracts, can be expected to reduce the overbuilding of stocks of this type.

CHAPTER 9

MANAGEMENT CONTROLS

A. NATURE OF MANAGEMENT CONTROLS

1. Delegation and Control

“Control” is a word much used in the military services and in industrial management. It has occurred frequently throughout the discussion of supply management in this manual and has carried a wide variety of meanings in different contexts: “supply control” for instance has signified the authority and responsibility to regulate stocks to meet future demand; “distribution control” is control of the movement of supplies through the distribution system; while “control of set assemblies” has meant the appraisal and restriction of designated item collections according to certain specific criteria. In devoting a separate chapter therefore to “management controls,” it is necessary first to know what we are talking about, even at a certain risk of expounding the obvious. Why should control be discussed as an independent function of supply management, divorced from the clearer functional responsibility of distribution, procurement, maintenance, or disposal?

Inherent in any organization, civilian or military, commercial or noncommercial, is the delegation of authority and responsibility for operations from the highest successively to the lowest levels in the organization. It is worth noting that the Army in its military operations has developed this principle of delegation further than any civilian organization. A troop commander, once his mission is established, is vested with almost unlimited authority to carry it out. In the more commercial operations of supply, however, delegation has not proceeded so far as yet, and in fact is not comparable in many cases to the delegation in commercial enterprises which perform similar work.

Whatever the extent of delegation, it requires as a counterpart the measurement by higher management of the performance by the indi-

vidual or activity to which authority has been delegated. Management must know not only what is being done but how effectively and how efficiently the job is being performed, if it is to make adequate plans for any future action. *The measurement of performance, together with the use of this appraisal to improve future operations, is the essence of management control*, and will be the central topic of this chapter. The basic concepts of delegation and measurement distinguish management control in its proper sense from broader uses of the term. Management control depends upon delegation and measures the fulfillment of delegated responsibility. First, information must be obtained from operating agencies that will enable management to plan and make decisions. Second, the system must provide a means for informing the organization of the plans and decisions that have been made. Third, the control system must enable management to know how well the decisions have been carried out.

Management control, therefore, is not an extension of the long arm of top management into the operating organization to dictate the specifics of job operation. While this intervention of management in operations at lower levels may be necessary in emergencies or where inadequate controls exist, each action of this kind detracts just so much from the area of delegation and makes just so much more difficult the measurement of delegated performance.

Since the nation and the Army are facing a world in which military readiness combined with the strictest economy is necessary over an indefinite period, the need is urgent for a continuous and developing system of management controls, based upon full delegations of responsibility and authority and measuring overall achievement of the delegated mission.

2. Development of Control Systems

The task of developing an adequate control system is one of the most difficult faced by the Army supply organization. The measurement of performance implies the use of standards against which performance can be measured. In the area of military operations the standards of performance are sharp and clear. In those consumer areas of supply management which deal directly with the supply of troops, that is, in meeting immediate supply demands, performance standards are equally well defined.

Economy in wholesale or producer aspects of supply management, on the other hand, is far more difficult to appraise. Techniques of providing financial data have been developed and will be discussed in this chapter. It must be emphasized, however, that these in themselves are accounting data and not control measurements. They require interpretation on the basis of experience accumulated over a considerable period of time before they can accomplish the aims for which they are intended. It is necessary therefore to build up and analyze military experience if effective and reasonable standards are to be developed for economy in Army supply management. As new accounting techniques are introduced and the process of analysis and refinement continues, it will of course be necessary to set interim standards, which will discover any deficiencies and test the adequacy of control data. Management must recognize the temporary nature of these interim standards, avoid a premature strictness in their application, and look beyond them to a continuous improvement in accuracy and effectiveness.

If controls are too rigid when first applied, their effectiveness often declines as both managers and operators become accustomed to them. The operator becomes adept at telling management what it wishes to hear, and management is content to measure progress toward the goal without questioning the continued adequacy of the original standard. It is important to recognize in the development of control standards that no amount of progress will substitute for constant questioning and retesting of the purpose and validity of any given measurement of performance. Supply management needs to be continually reappraised if control standards are

to be adequate to changing concepts and changing conditions.

3. Use of Control Measurements

It has been pointed out that the function of management control, in addition to the measurement of performance against standards, includes the use of these measurements to guide future management action. We have also seen that such action cannot include direct intervention in operations at a lower level without compromising the standards of measurement which are the source of controls. What use then can properly be made of control data? First, adequate control data may lead to action rewarding or penalizing superior or defective performance by an individual or an activity. Where clear-cut standards have been developed in military operations as in commercial life, inadequate performance, if substantiated by further inquiry, leads to the transfer or removal of the responsible individual or individuals. The serious consequences of control measurements make it essential that the standards themselves be recognized as adequate and unequivocal before such action is taken upon them.

Equally important with the recognition of performance at subordinate levels is the use of control measurements by management to evaluate and improve its own decisions. Was the delegated responsibility properly defined? Was the responsibility too broad or too narrow as originally delegated? Was the delegated authority commensurate with the scope of responsibility? Control data are properly employed in seeking answers to such questions as these, and in changing assignments, organizations, or missions to achieve greater effectiveness and economy. Frequently deficiencies in supply performance can be traced to causes outside the control of the responsible manager. In the complex system of Army supply, the control of different commodities is inextricably related, and defective supply or emergency demands in one area may affect a wide group of other management organizations. It is the job of the appropriate level of management to use control data to detect such imbalances and distortions of performance and to assist subordinate organizations by removing all possible obstacles to the performance of their assigned missions.

In addition, the supply system as a whole is not an independent organization; far less so in fact than any commercial merchandising concern. The primary purpose of Army supply is to provide service, not to an independent aggregate of consumers, but to a consuming organization of which the supply system itself is a part. It is constantly under pressure from this organization to provide more effective supply and to respond to developments in weapons, tactics, and strategy. From the other side, it is subject to the pressures of technological change and the introduction of new equipment, which must be absorbed into the system, correlated with old equipment, and phased out to the consumers. In all its operations the supply system works under the close scrutiny of authorities within the Army, the Administration, and Congress. The management of the supply system must respond to all these demands and must choose that response which will do the job most economically without disruption of the supply organization. When a new item is introduced, for instance, many questions must be settled at the management level before the operating problems of supplying the item can be effectively solved. How much will it cost to introduce this item with its repair parts into the supply system? What adjustments must be made in the supply of related or replaced items and how will this affect the control of such items? Where should supply responsibility be placed for the end item and for

the repair parts and accessories? Informed action on these issues can only be initiated after collecting and interpreting adequate control data.

Management, as distinguished from operation, acts primarily through delegation of work to others. It is not too much to say, therefore, that adequate control data are the basis for all actions which properly belong to the sphere of management. Without such data, management either must act outside its sphere, intervening in operations in response to various and often contradictory demands upon it, or else it cannot act at all.

4. Levels of Control

Within the supply organization, the Office of the Deputy Chief of Staff for Logistics and the headquarters of the technical services are the activities farthest removed from the operating phases of supply. As a consequence, these organizations have the greatest interest in appraising performance of the missions which they have delegated and in the establishment of effective controls. At each subordinate level, however, responsibility for operations is combined with a degree of management control. While this chapter will deal with the overall problems of control in the Army supply system, the principles of control are applicable at every level of responsibility.

B. EFFECTIVE AND ECONOMICAL SUPPLY PERFORMANCE

1. Introduction

Management controls in the supply system must have the objective of measuring and relating performance in both the area of adequate or effective supply and economical supply. We have already seen that standards of effective supply performance have been well developed over nearly two centuries of Army supply operations, but that standards of economical supply have yet to be fixed, and that the supply system is just beginning to produce the data on which these standards must be based.

2. Necessity for Incentives to Economy

a. Economy of Inventories. There are two

major problems for the Army in the achievement and control of economical supply operations: the tendency to accumulate excessive inventories at all levels and the tendency to operate without sufficient concern for the cost of supply. The basic causes of these problems are not far to seek. Until the recent past, there has been no adequate method for measuring overall excessive inventories or excessive operating costs. The incentive to effective supply, therefore, has been overriding; the only compelling concern in the Army system is to have enough of any item to supply all needs. *For example*, the station property officer realizes that it is only by failing to supply the troops at the station at which he is located that he will be subject to substantial

criticism, whereas excesses may result in little more than an exchange of correspondence with the depot or the Army Headquarters. If he fails to supply needed items to the troops at the station, retribution is swift and sure, because the station commander who is responsible for training the troops at the station is also responsible for the efficiency rating of the property officer. Neither excesses nor shortages of mission stocks at the depot generally are of great concern to the depot commander because he seldom has control over the items he stocks and is therefore unaffected by whether the inventories are too large or too small. The inventory control point is usually responsible for the computation of requirements and the distribution of supplies within the technical services. Here if an item is in long supply, it is often impossible to determine whether the excess quantity has resulted from an error in the basis for the computation of requirements, an error in the computations, a mistake in procurement, maldistribution among the depots, inaccuracies in reports of stocks on hand, errors in consumption rates upon which requirements were computed, or unexpected returns to stock. Because the various functions bearing upon the same item are split among a number of individuals, it is virtually impossible to fix responsibility for an excess quantity. Further, some time may elapse between the erroneous action and the ultimate identification of excesses. This is generally long enough for transfer of personnel and changes in the organization to make it impossible to fix responsibility. On the other hand, shortages of an item may result in quick criticism of those responsible. A complaint from the Army command to the Chief of Staff is relayed to the chief of the technical service through the Deputy Chief of Staff for Logistics. The chief of technical service immediately passes the criticism down to whatever agency within his service is responsible for the computation of requirements and the distribution of the item. Such shortages tend to develop within the relatively short space of time required to compute requirements, procure, and distribute supplies and responsibility is quickly placed.

b. *Economy of Operating Costs.* Just as the inventory manager is subject to limited criticism

when he is in long supply, there has been limited criticism for operating with excessive costs. It is difficult under present cost systems to measure adequately the relationship between size of inventory, costs of operation, and adequacy of performance. Under these circumstances the inventory manager must take cognizance of the fact that the major criterion used in measuring his efficiency is how well he furnishes supplies.

3. Integration of Standards

To develop the incentive to perform the supply mission economically, it must be possible to measure performance against three standards: adequacy of service, the size of working inventories, and operating costs. It is no advantage to the Army or to the nation for the supply manager to do a poor supply job even if he does it economically. In other words, the manager who operates with a small inventory and few personnel but fails to meet the supply mission is useless to the Army. On the other hand, if two supply managers do a good job with comparable operating costs but one accomplishes the mission with an inventory of only a million dollars and the other with an inventory of five million dollars, the manager who performs the job with the smaller inventory should be rewarded with recognition of his accomplishment. It must be possible to relate and weigh these three factors of *good performance, a high inventory turnover, and low operating costs* in measuring the efficiency of supply. Until it is possible to rate the efficiency of the supply manager by all three standards, there is no means of developing the incentive to do a good job economically. Any system of controls must therefore be capable of measuring both adequacy and economy of performance.

This chapter therefore will discuss control data and the use of these data to achieve effective and economical supply. Quantitative and financial controls will be discussed first, to be followed by the control of operating costs. The final section will take up the integration of these controls with the measurement of effectiveness in supply to provide the most complete appraisal of performance.

C. QUANTITATIVE CONTROLS

1. Necessity for Quantitative Controls

The problems of operating the supply system with minimum inventories of all commodities, and certain approaches to the solution of these problems, have formed one of the principal topics of this manual. It is impossible to operate the system satisfactorily without accurate, detailed, and timely records of quantities of specific items in the inventory, and movement of these items into and out of the distribution system. Item-by-item accounting for stock is essential to the operating control of the supply system. In fact, there are few commercial organizations which have developed such highly refined methods of item accounting as the Army.

The basic elements of quantitative inventory recording and reporting have been pointed out in chapter 3. These reports generally show for each item, by condition and account, the quantity on hand, the quantity on order, the quantity on backorder, and the quantity issued, usually for the calendar year to date. This logistical reporting network is based primarily on depot stocks, but has been extended by the Army Supply Status Reporting System for selected items to stocks at stations in the continental United States, at oversea installations, and in the hands of troops. Although these reports are subject to some percentage of error and are not always as timely as might be desired, they nevertheless represent a comprehensive and exhaustive compilation of Army assets wherever located.

2. Limitations of Quantitative Controls

The size and scope of this compilation of assets, however, present a very serious problem for control by management. The size and diversity of the Army's inventories are such that they cannot be effectively reviewed or measured on any overall quantitative basis. We have noted in previous chapters the tremendous number of items in the Army supply system. The total number of items handled by an inventory control point may vary from a few hundred to hundreds of thousands, according to varying responsibilities for end items only, for repair parts, or for the two together. The number of items in stock at a depot is seldom less than 10,000 and can be as high as a quarter of a million items. The

number of items held in stock by a technical service property officer at a station is seldom less than several thousand and often, where repair parts are involved, may amount to 25,000 or more different items. An inventory status report of these stocks, broken down by conditions and accounts, requires literally hundreds of sheets of paper filled with columns of information.

It is only at the smallest installation with the smallest of inventories that the operating supply manager can possibly study each item individually. Even here it is unlikely that a higher level of management could reach meaningful conclusions about this manager's performance on the basis of item-by-item quantitative reports of his stocks.

3. Centralized Control and Accountability

a. Introduction. As a business operation vastly larger than any civilian organization, the Army faces a monumental task of supply management. Sound management decisions and adequate, timely service to the customer can result only when inventory control actions and management reports are accurate and timely. The present Army supply system leaves much to be desired in these respects, largely because of the astronomical amounts of data which must be processed and the difficulties encountered in transmitting data promptly from place to place.

The supply and stock control activities of the technical services require the use of electrical accounting machines (EAM) to provide a means of consolidating and disseminating vast amounts of data. The EAM systems were adopted in the early 1940's mainly for consolidating stock status information. Mass data received from depots, procurement offices, and catalog agencies require expeditious processing to be of any value because actions originating from out-dated statistics result in over or short supply and maldistribution of stocks.

Within the past few years, electronic data processing equipment has been developed and placed upon the market. This equipment provides a new horizon in the field of data processing, in that it increases capacity, flexibility, and speed far beyond previous limitations. It

opens the door to possible use of centralized inventory control and the provision by a central agency of timely, adequate management reports.

Since the phrase "centralized inventory control and accountability" can mean many things to different people, it is well to define what we are talking about. As used in this chapter, the term refers to the establishment within each technical service of one or more central installations, each charged with the stock control, supply control, and property accountability. When practicable, a single supply and stock control point would be utilized for all supply items handled by the technical service. Commodity centers, each responsible for control of all supplies in a broad commodity grouping (e.g., ammunition, repair parts, or subsistence) also are included within this definition. Under this concept, all requisitions from station supply offices and Oversea Supply Agencies are sent to the appropriate supply and stock control point. Similarly, Military Interdepartmental Purchase Requests (MIPR's) and requisitions from other authorized sources are directed to the central point. All stock control records are maintained centrally, the only supply records kept at the depot level being those required for local use. Reports on receipt of supplies, periodic or special inventories, changes in serviceability status, and property disposed of are forwarded expeditiously from the depot. Requisition editing, availability determination, initiation of shipping orders or purchase requests would all be accomplished centrally. In addition, property accountability, determination of stock levels, initiation of action to replenish stocks, and submission of necessary supply reports would all be the responsibility of the central supply and stock control point.

While property accountability is concerned with accounting for material, the point at which this function is performed is not dependent on the physical location of supplies. Under the system of remote accountability used extensively in the past, satellite depots have been responsible for storage functions and receipt and shipment of material at the direction of the accountable depot. Centralization of record keeping in this manner has enabled reduction in the cost of stock control operations, has reduced the number of

shortage reports, extracts, and re-extracts, and has provided speedier submission of management reports. Automatic Data Processing Systems (ADPS) appear to be the means which will afford the technical services with the opportunity to further centralize.

b. Automatic Data Processing Systems.

- (1) *Capabilities.* Successful operation of the centralized inventory control and accountability organization described above depends upon the speed and accuracy with which volumes of data can be processed. Automatic Data Processing Systems provide a new tool, and an extremely powerful one, which offers far greater flexibility and speed of operation than has ever before been possible. Most of the data processing functions of material supply can be performed easily and naturally by this equipment. The computing machinery itself can perform any of the arithmetic operations of addition, subtraction, multiplication, and division. It can sort and arrange data, compare numbers, and make logical decisions based on such comparison. It cannot evaluate nonnumerical considerations. This imposes a limitation, since human judgment must be applied to use such considerations as a basis for decision. However, to the extent that firm judgment factors can be expressed in machine language, the machines can make decisions. With faster handling of data, and more comprehensive and timely analyses, better information will be available on which to base management actions.

In order to centralize inventory control and property accountability in a workable manner, a means of rapid, accurate communication is required. All the benefits will be for naught if there is delay in transmitting information between the depots and the central supply and stock control point. This problem has been solved through use of accurate, high-speed transceiver networks which transmit data punched into standard electrical accounting

machine cards between points distant from one to many thousands of miles over either radio or telephonic facilities.

- (2) *Limitations.* Automatic Data Processing System technology is in a dynamic state because of the general trend in electronic development and the highly competitive nature of the data processing equipment industry. Manufacturers are constantly announcing improved and less expensive devices, engineering advances and developments. Agencies considering acquisition of computers have a difficult task in determining the most advantageous equipment. If decisions are delayed each time new advances are announced, it is conceivable that years would elapse before an agency would actually procure the equipment. While furnishing the same basic end results, there is sufficient difference in the design of each manufacturer's equipment to make them incompatible. In addition, the industry as a whole seems to have relegated the development of compatible transmission (communication) equipment to a position of lesser importance.

In addition to the foregoing, increased vulnerability to enemy action through use of centralized inventory control cannot be denied. Although this vulnerability can be minimized by provision of duplicate records and compatible ADPS installations throughout the Army, the capability of independent operation which is possible under a decentralized system will not be possible.

- (3) *Factors in selection and establishment.* There are numerous factors to be considered in connection with the selection and establishment of ADPS. All or only some of these may apply in any particular case, however, the considerations enumerated below are considered applicable in most instances.

Electronic computers require conversion of numerical or alphabetical information

to coded information for input to the machines. Each manufacturer employs a somewhat different code system. Computer tapes from one system cannot be processed by another. A problem exists in transmission because of the incompatibility between the varying machine and communication codes. Since the several technical services will undoubtedly propose the utilization of different types of equipment, serious consideration must be afforded this matter in order that the Army will not collect a heterogeneous array of equipment incapable of being welded into an integrated system.

Obviously smaller machines have a lower initial cost, however, if the machine does not have the capacity for the solution of certain major problems in a single operation, it will be necessary to solve them piecemeal. Such action will serve to decrease the effective speed of the machine. This argument would appear to favor the acquisition of only the larger equipment, however, caution must be exercised to insure that a steam shovel is not being purchased to dig a post hole.

Auxiliary equipment must also be carefully chosen. If such equipment is inadequate in amount and speed, much of the capacity of the computer may be wasted. The cost of this equipment must be weighed against the cost of wasted computer time and a decision made as to how much and what kind to acquire.

Personnel considerations must certainly receive paramount attention in any decision to employ electronic data processing equipment. A computer can do only what it is instructed to do by human beings. Preparation of these instructions, called programs, and other aspects of the operation require well-trained personnel, including systems analysts, programmers, equipment operators, and maintenance personnel. The labor market for such personnel can be best classified as "great demand

and little supply." Thus, a vigorous training program must be instituted. Full advantage must be taken of the training offered by manufacturers of equipment and by certain colleges and universities, the consultation and technical advice offered by the National Bureau of Standards, and the many professional conferences and symposiums on the subject.

There are a number of additional problems that are likely to arise in installing ADPS in connection with the conversion to centralized control and accountability. These will be brought about by additional workload during conversion, changes in methods and organization, reduction in and displacement of personnel, and changes in job classification. A rather drastic change in methods is implicit in the electronic approach to data processing. Many individuals must adjust to new jobs and learn new skills. Such may be quite difficult to some, especially to old-timers. Probably some persons will be separated and others will be required to move to new locations. All of these factors have a disturbing influence on the morale of the personnel concerned. Timely planning and vigorous implementation of the plans may prevent some of these problems and will undoubtedly lessen the effect of the remainder.

c. Conclusions. The advent of electronic data processing machinery and high-speed data transmitting equipment appears to favor the trend toward centralized control and accountability. With up-to-the-minute records of availability and location of supplies, and with only one agency allocating supplies, it appears logical that better service to the customer should result. Complete, current information, in one location, capable of being processed with electronic speed, should result in more comprehensive and timely information for the use of management in making decisions and checking performance. Reduction in the cost of stock control and accounting operations should be possible through utilization of ADPS at one central location, rather than by

less efficient methods at scattered installations. Reduction in inventories should be made possible. With greater speed and improved control, supply levels may be safely reduced. Transportation costs can be minimized since interdepot shipments and cross-hauling can be substantially reduced. Greater flexibility can be provided if timely steps are taken to coordinate installation of ADPS throughout the Army, in the procurement of compatible equipment, and the installation of standard procedures. Lastly, ADPS provides the capability to expand machine volumes without corresponding personnel increases.

ADPS can contribute to many functions other than supply. Of Armywide interest are personnel and fiscal accounting; these with supply accounting will form the backbone of any integrated general-purpose data processing system that may be developed. In addition, the technical and administrative services have specialized functions capable of being mechanized. These include problems of movement control and traffic management, construction programming, real estate accounting, and flood control, medical statistics, communications, technical intelligence, and research and development. Not every specialized application will have sufficient volume of data to justify an economical ADPS application, however, many specialized applications can be performed with advantage by ADPS installed for other purposes.

ADPS is not just an array of hardware, but rather a combination of complex machinery, carefully engineered systems, and skilled personnel. Effective ADPS application will only be achieved through actual experience in the use of the equipment. Only by experience can the Army accumulate know-how and confidence in the ability to master these systems. Actual use should also lead to unforeseen application and benefits.

Under any scheme of management, one fundamental military principle should be retained—ADPS is a tool of management. Whatever the particular application being performed, it assists the responsible commander by receiving large volumes of data, storing and analyzing it at great speeds, making routing decisions, and presenting results to the commander and his staff for judgment and action. Regardless of

what the advantages appear to be, in no event should centralization of control and accountability be an objective in itself. The number of record keeping activities should be consistent with a supply system that is responsive to consumer demand and provides data for the most efficient supply management at the least cost. Each proposed system should be evaluated upon its individual merits and the circumstances involved.

4. Consolidation of Quantities

It is apparent from the foregoing discussion that a consolidation of inventory data is required, not to replace item-by-item accounting, but to convert this enormous mass of operating figures into the measurements and comparisons which are essential for adequate control. Certain consolidations have in fact been used for some time past; these include inventory data by tonnage and by line items. Tonnage reports indicate tons shipped, received, and in storage,

and reports are also collected of the number of line items shipped, received, backordered, or extracted to another point of supply. Both of these consolidations are valuable, in fact essential in some areas of supply. Tonnage figures are necessary for the control of transportation, handling, and storage, while line item figures provide the same kind of overall measurement for clerical and administrative workloads. But neither of these methods provides a reliable measurement of the size and movement of inventories. Tonnage figures are an index of bulk, but if applied to the overall control of inventories, result in a highly misleading equation which gives the same importance to a ton of coal as to a ton of radio tubes.

The need for a common denominator of inventory size and movement which would provide meaningful overall control data has led to the adoption of financial valuation of all Army stocks. Financial controls will therefore be the subject of the following section of this chapter.

D. FINANCIAL CONTROLS

1. Army Financial Management Plan

a. Introduction. Until recent years the Army was a comparatively small organization and those responsible for its management could plan, observe, and control its activities directly. They could personally organize, integrate, and analyze the data flowing to them from their subordinates. However, the rapid and huge expansion of the Army and its entry into many new fields in World War II brought real problems of management at every level. The commanders needed accurate, timely, selective, and correlated information for making and arriving at decisions concerning organization, staffing, and operations.

While we have traditionally excelled in the art and science of warfare, we have not, until recent years, used the best available means of managing the material wealth that is so important a part of modern armies. Few will argue that many of the basic management principles common to government and business can be applied to most of the activities of the Army. However, while recognized business methods may be applied directly to many operations, others must be adapted in varying degrees to

meet the diverse activities and unique needs of the Army.

The Army of course is not a business establishment and cannot be judged solely by business standards. The Army will never be in a position to declare a dividend. But in accomplishing its basic mission, the Army probably engages in more business transactions than any other organization on earth. In view of this tremendous management job, it seems obvious that the Army needs something more than a check book and bank statement to manage its financial affairs. The responsible commanders in the Army, who are faced with the management of this Goliath, are entitled to the best systems of financing and administration that it is possible to devise. Certainly no businessman in a comparable situation would accept anything less.

In order to fully appreciate the importance of financial control, it may be well to review what has transpired in this field over the past decade. It will be recalled that the first Hoover Commission pointed up the need for improving financial management in the Department of Defense. This, together with other studies, resulted in the

enactment of Public Law 216 by the 81st Congress in 1949. The stated purpose of this law was "to reorganize the fiscal management in the National Military Establishment to promote efficiency and economy." Among other things, the law provided for comptrollers in the Department of Defense and military departments, Performance Budgeting and Accounting to measure the cost of functional programs and activities, and the use of working capital (revolving) funds for financing industrial and commercial activities. Subsequently, the same Congress enacted The Budget and Accounting Procedures Act of 1950 which provided for full disclosure of the results of financial operations, adequate financial information for use in management and budget administration, and effective control over revenue, expenditures, funds, property, and other assets. It was intended that emphasis be placed on effective orderly improvements with the objective of achieving simplified and more effective accounting, financial reporting, budgeting, and auditing.

It should be noted that the Army itself early recognized the need for improving the management of its financial affairs. Even before enactment of PL 216 the Army had established a comptroller. One of his principal tasks was to inaugurate improvements in financial management. The statute provided a legal basis for this new organizational entity. Following enactment of the law, the Army proceeded vigorously with the organization of comptrollership at all levels of nontactical command to provide the needed foundation for improved financial control. Development of this effort was temporarily slowed down by the Korean Conflict, however, this episode itself served to highlight some of the weaknesses of the existing system. With the termination of the Korean Conflict, the Army resumed its efforts to improve financial management. The continued external interest in this activity, including the Office, Secretary of Defense, and various Congressional Committees, served to stimulate this effort and in 1953 Army Regulation 37-5 was published which set forth the Army's comprehensive program for improving financial management.

It is apparent from the foregoing that financial management is not something new in the Army and it is not confined to the so-called financial

experts or to the budgeteers and accountants. Every commander is involved in financial management. Many of his decisions have an impact, directly or indirectly, on the financial position of the Army. Responsibility for effective financial control is part and parcel of overall operating management responsibility.

The Army Financial Management Plan is aimed at improving the control and management of resources. In order to prevent misunderstanding, it should be emphasized that this program is not directly concerned with the tactical side of the Army. It does not extend to tactical units, although their requirements for and use of resources are a part of the total Army requirements.

In today's environment, more than ever before, military effectiveness depends upon materiel support and effective control of that materiel support. Economy is not limited to monetary savings, or returning the taxpayers' money to the Treasury, important as that may be. It means getting the maximum combat effectiveness from all resources, *men, money, and materiel*, available through proper application of the fourth M—*management*. This in turn means that each individual must be motivated—the fifth M, namely *motivation*—to do the best job possible with the resources placed at his disposal. Furthermore, the means must be provided to the supply manager for evaluating the results of his efforts.

Management of the Army's programs and resources is achieved through the two basic processes of the Army Program System and Financial Management. It is through the first process that action programs are planned, executed, and appraised. Through financial management, action programs receive financial support, control, and appraisal. Therefore, programming and financial management are complementary, interdependent techniques for management of operations and resources. Improved financial management is based on three premises. First, Army plans and programs must be translated into financial terms. Secondly, financial responsibility and authority must be fixed at the points where operations take place and decisions are made. Finally, results of operations and changes in the status of resources must be systematically

recorded and reported as they occur. Considered as a whole, these premises form the basis for the Army Financial Management Plan.

b. *Financial Inventory Accounting.* Among the more important elements of the Financial Management Plan are the portions that pertain to physical assets or property. There is usually more money tied up in inventories and real property than in any other asset of an organization. The very magnitude of the Army's investment in supplies indicates the need for control. The question is, "How do we control this giant?" Let us see if this Achilles has a heel.

Our civilian commercial enterprises have two methods for controlling their inventories, or if you prefer, balancing supply and demand. First, input is controlled by buying only what they expect to sell. If a bad purchase is made, the remainder of the order is canceled. Like the Army, the demand must be anticipated. Secondly, they control output by offering bonus incentives to their salesmen, by placement of merchandise within their store, by advertising, by display, and numerous other devices. In other words, a market is created. Conversely, the Army attempts to plug the outlet. Supply economy is emphasized. When a bad buy, or a poor estimate of requirements is made we are stuck with it. The recourse is to store the excess for long periods of time and consume it by attrition, or dispose of it as surplus. It is apparent that the point of input is more vulnerable to control than output. If only required quantities are ordered, large excesses will not accumulate.

Financial Property Accounting is the term used to describe the establishment and maintenance of property accounts in terms of dollar values as well as quantities. It is being applied in two broad increments. First, inventory accounting for bulk stocks in the hands of depots and installations, and secondly, fixed assets including real property, buildings, and equipment in use. "Financial Property Accounting" is the phrase applied to both of these increments, including inventory and fixed asset accounting. The term "Financial Inventory Accounting" applies only to that portion of Financial Property Accounting which is designed to provide monetary information for bulk supply inventories.

Management of inventories is not new to the Army. For years stocks have been managed by means of item control. With this control by item, why do we need to put a dollar tag on supplies? The focal point of item control lies in the stock record card. Post property officers open a stock record card for each item in stock. Based upon work measurement data, a clerk is assigned to manage a given number of items. The clerk establishes a control level based upon issue experience. The control level consists of the sum of the approved operating level, the safety level, and the order and shipping time. Periodically, the quantities on hand and on order are added and the total is deducted from the control level. A requisition is prepared for the difference and supplies flow into the system. You will note that the critical point is the control level. This is adjusted periodically and verified by command liaison visits. The fact remains, however, that there are so many items in the supply system that a timely review of all items is virtually impossible. Management has long needed a means that can be used to influence the inventory position of the command. It is only at the smallest installation, with a minimum inventory, that the supply manager can possibly study each item individually. In addition, item information loses its value as it progresses to higher levels of management. The Army needed a device for gaining and maintaining control of bulk inventories, and this led to the development of Financial Inventory Accounting.

In essence, Financial Inventory Accounting is a method of summarizing the stock position by pricing inventories and reporting inventory transactions. The most understandable method of explaining the system is to review the developments.

The first step in establishing Financial Inventory Accounting is to establish logical classes or categories of materiel covering all items stocked by the Army so as to bring together like items into significant groupings for management purposes. *For example*, all items of clothing such as socks, shirts, and trousers, would be brought together in a single grouping, all heavy artillery would comprise another grouping, and all dry batteries a third grouping. These groupings are referred to as categories. The next step is to

price items of inventory and obtain an opening balance by category. Standard prices are established for each item and the dollar sign is used as a yardstick to measure quantities and activities within each category. Next, transactions pertaining to sales, receipts, adjustments, procurement, etc., must be recorded financially by establishment of ledgers to indicate activity by category of supply. Finally, a uniform reporting system must be established to present a summary of inventories and inventory activities to higher echelons. Two reports have been designed for this purpose. The first is called the Statement of Inventory Transactions. It reflects the dollar value of the opening inventory, increases and decreases by type during the reported period, and the closing inventory. Examples of the type of transactions reflected by this report are: disposals, receipts from organizations, and station returns to depots. In addition, this report provides a method for accounting for stocks in transit between supply installations. The Army owns millions of dollars worth of supplies that previously were not accounted for by anyone. This report reflects the value of such supplies by technical service. The second report is called the Supply Management Report. As the name implies, it is a report designed to manage stocks. It is designed to indicate by category the dollar value of both the stock and supply status of inventories. It provides information concerning the stock status of the Army's inventories by identifying stocks held for operating requirements, reserves, claimants, and excesses. It also provides information concerning the input into the supply system and the amount and type of demands which are placed upon bulk stocks. A series of logistical ratios, completed at each echelon of reporting, are designed to make the report as self-analytical as possible for management purposes.

The coverage of Financial Inventory Accounting extends to bulk inventories only and specifically excludes combat areas and materiel in the hands of troops. Initially, the system was installed in all continental United States accountable depots in January 1954 and in 26 posts, camps, and stations, 5 ports of embarkation, and selected installations overseas in July of that year. Subsequent extensions in both CONUS and

oversea theaters have resulted in the greater portion of the Army's bulk stocks being accounted for under this system.

The establishment of inventory values in record form is a prerequisite to the utilization of modern inventory control techniques and to the accumulation of cost of programs and activities termed "program costs," or the cost of goods and services produced, referred to as "production costs." It is therefore needless to say that Financial Inventory Accounting is also a necessary prerequisite to the establishment of the cost of performance budget inasmuch as the value of resources available, needed, and utilized can be derived only from such accounts. Financial Inventory Accounting is also required in connection with the establishment and operation of working capital funds. Included in the inventories brought under financial control are items of property that are or will be picked up as assets of specific industrial funds and stock funds. In the case of industrial funds, such items are included in inventories of raw materials and supplies. The consumable items constitute the major assets of the various divisions of the Army Stock Fund.

c. Stock Funds. Public Law 216 not only identified the functional elements involved in financial management but recognized the need for and authorized the use of special management devices to fit certain types of operations that are comparable to private industry. Among the more important of these special devices were "working capital" funds which are revolving funds established to finance certain operations or activities that furnish goods or services on a reimbursable basis.

One of the most important types of revolving fund from the standpoint of its impact on Army-wide financial administration is the Army Stock Fund. This fund is used to finance inventories of consumable supplies or common use standard stock items, which are supplies of the type that generally may be considered to be expended when they are withdrawn from the stock fund for use. Some examples are: medical supplies, subsistence, clothing, hardware, fuels and lubricants, and repair parts. Items such as automotive vehicles, weapons, tanks, and aircraft do not meet the "consumable" criteria outlined above and

accordingly are not generally considered as being suited for inclusion in a stock fund.

In the past, procurement authority, based upon an approved procurement budget, was given to the chiefs of technical services. Appropriations were expended directly to replenish depot stocks. Depots effected a free issue to support bulk inventories at station level, and the station supply officer made a "free issue" to the consuming activity or user. Under this system of financing, the Army did not know the dollar value of the investment in inventories nor the dollar value of material issued to the user. Actually, the Army was placed in the position of asking for dollars to sustain current requirements, without being able to show true dollar consumption. Consumption is particularly significant in the case of common use recurring issue type items. The purpose of the stock fund is to correct this condition.

In operation the stock fund pays for the supplies procured and is reimbursed from available appropriations for the goods furnished from stock. The reimbursements received by the stock fund are available for replenishing stocks without the necessity for further appropriation, hence the term "revolving fund."

From the standpoint of the activity buying such supplies from the stock fund, it means that the requisition of supplies is controlled by the amount of funds available to pay for them—that is, no more "free issues." The resulting expenditures are reflected in the activity's accounts where they enter into the determination of operating expenses.

When a stock fund is established, all inventories of supplies and equipment in the categories to be covered by the fund are capitalized, or given a dollar valuation as assets. Additional cash for working capital is also allocated to the fund. The managers of the fund buy stocks with their working capital according to estimates of future needs and sell stocks to Army customers and other federal agencies. Under this concept, appropriated funds with which to reimburse the stock fund manager for supplies received are allocated and allotted to the customer. These funds may then be used by the stock fund manager to replenish his inventory. Thus, the fund becomes self-perpetuating, since the process will

be repeated after other purchases are made and sold to customers. The method of funding the customer will be discussed in more detail in a later portion of this section.

In the initial capitalization of items being included under the stock fund, a standard price for each item is utilized. From this point of capitalization forward, all activity for each item must be computed at the standard price. The standard price for each item is obtained from catalogs, pricing guides, or other pricing media which are provided by the responsible supplying service. Revision to pricing media is effected as frequently as is necessary to satisfy sound business practices and sufficiently in advance of the effective date of price change to permit dissemination to customers and an orderly revaluation of inventory. The standard price of each item normally consists of the current market price of the item at the time the price is established plus a surcharge to compensate the stock fund for first-destination transportation and minor losses through pilferage, breakage, deterioration, etc. It is the objective of the stock fund pricing policy to "break even" over a period of years, although market fluctuations may result in temporary financial gains or losses.

Stock fund reports of course provide the same type of financial data on inventories on hand, sales, dues in, dues out, etc., as financial inventory reports and are susceptible to the same methods of measurement and control. In addition, the stock fund must provide the fiscal reporting necessary when appropriated funds are involved. The stock fund therefore provides an automatic check on movement toward an excessive stock position. As stocks are built up or as sales (or issues) decrease, more of the fund is tied up in inventories and less cash is available for the purchase of new supplies. This factor alone is certainly a challenge to the stock fund manager and requires a near perfect job of merchandising. If he invests his money in supplies that do not have an active demand, it follows that he will eventually run short of cash to buy the things his customers need. In commercial practice this is called "nailing dollar bills to the stock shelf." Conversely, if stocks are in an excess position when the stock fund is instituted, the fund itself will tend to be too large and will not

provide adequate control of this kind until it is reduced.

There are still other advantages for supply management inherent in the institution and operation of stock funds:

- (1) Funds are provided automatically for replenishment of stocks through reimbursement to the stock fund for material consumed or sold. When annual appropriations are made for the categories of supplies covered by the stock funds, the money is not allocated to the fund but to the consumer who buys from it. The fund itself is free from the limitations of one-year appropriations, and so far as Congressional action is required, is free to purchase stocks at times and in quantities which will provide the most economical supply. There is no incentive to place obligations other than those actually required. Purchase of stock fund items may often be timed to take advantage of seasonality or other current market conditions, whereas such timing would be much more difficult if the items were financed under the limitations of annual appropriations.
- (2) Because allocations are made to the consumer, a closer financial control of using activities is possible than when allocations are made to procuring agencies. Financial controls exercised or made possible through stock funds therefore have a much broader scope than the supply system alone.
- (3) To the extent otherwise deemed appropriate, single service supply, or cross-servicing between departments, is facilitated in the case of those supply items financed under the stock fund, because such stocks may be procured from, and "pooled" under, one fund by the department responsible for receipt, storage, and issue, with avoidance of separate procurement and accounting for stocks by several owners.
- (4) Financing through a stock fund of mobilization reserve stocks of consumable materials, supplies, and equipment

results in their protection for the use intended because they cannot be diverted to meet current needs without provision for replacement through reimbursement from current appropriations.

d. Industrial Funds. Working capital funds with their revolving features can also be applied advantageously to industrial and commercial type activities that produce and furnish goods or render services to other activities on a reimbursable basis. Such revolving funds are referred to as industrial funds and are intended to provide the same type of control for manufacturing operations and similar commercial activities of the Army that stock funds provide for supply activities.

The Army Industrial Fund was established under the authority of Public Law 216 with initial working capital transferred on the books of the Treasury from unexpended appropriations. It is intended to provide in general the same operational flexibility, control, and management to the commercial and industrial type activities of the Army as is afforded in private industry.

Each installation or activity selected for this type of financing is provided a single revolving (working capital) fund to buy the material, supplies, labor, and other services required in the manufacture of the product or rendering of the service. Each such activity operates as a business entity and is reimbursed on the basis of the cost of goods delivered or services rendered.

Manufacturing arsenals, clothing factories, research laboratories, depot maintenance divisions, and printing plants are examples of the type of installations suitable for operation under the industrial fund concept.

When it has been determined through a feasibility survey that the industrial fund system is adaptable to an installation, a tailor-made double-entry accounting system is designed to fill the needs of that establishment, and a management control system to utilize the data made available is developed. When the systems have been designed and tested, the establishment is chartered just as is a private corporation. Its capital is made up of a cash allocation in the form of a project cash account with the Treasury, and the

capitalized value of inventories on hand less outstanding liabilities. In the production of goods and the rendering of services, the assets of the establishment are used to finance all operational costs except certain statistical costs such as military pay and allowances, depreciation of plant and equipment, etc. The monies thus expended for labor, materials, and overhead, both administrative and manufacturing, are reimbursed to the performing establishment by its customers from the appropriated monies available to them for acquiring these goods and services. Thus the revolving feature of the fund is established and the working capital of the fund is kept intact.

The Army Industrial Fund differs from private enterprise in that no profit or loss is intended as a result of work performed. Another significant difference is that the cost of plant and equipment is not depreciated. Both plant and equipment are provided to the industrially funded establishment through funds made available by normal appropriations. Both of these have been considered disadvantages of the system. Other disadvantages of the system are the lack of control by installation management over the volume of business to be done, excessive overhead costs in time of low volume that cannot be reduced because of mobilization requirements, and the shortage of personnel familiar with business methods and techniques and double entry accounting systems.

The primary advantages of the Industrial Fund are the elimination of funding by several appropriations, allotments, and suballotments through the use of a single working capital fund, the elimination of the many different accounting systems by the tailor-made double-entry accounting system for all operations, the provision of accurate cost data for evaluation and management use in controlling operations and evaluating performance, the provision of factual end-item costs, and wide flexibility to the commander in the use of resources. The industrial fund makes available to the operator the resources and authority to carry out his mission. In addition, it establishes an atmosphere of cost consciousness at all levels within the establishment and encourages the use of engineered or statistical standards and scientific analysis. This permits management by exception.

The financial reports submitted by industrially funded establishments include balance sheets and operating statements of income and expense, etc., similar to those prepared by commercial manufacturers. In addition, supporting schedules of inventory transactions, analysis of accounts receivable, and accounts payable, production data, and the like are prepared. An annual report covers the past year's operations to include management and operating improvements, savings, a forecast for the coming year's operations, and the planned management improvement program. Additional financial and operating report schedules are prepared for installation management use and for the controlling technical service limited only by the imagination, inquisitiveness, and vitality of individuals concerned. The inventories and other working capital assets of Army Industrial Fund installations are not included in the normal logistics asset reporting network, but are controlled as a part of the general business management of the industrial fund.

Use of industrial funds encourages the exercise of business type controls in the management of the installation or activity. It also simplifies the accounting and facilitates the accumulation of accurate end-product cost information which is the basis for billing the customer. The customer through this process has accurate cost data for recording in his accounts and for use in budgeting for the programs and functions under the respective appropriations.

e. Consumer Funding. Since the Department of the Army must make available its appropriations to the various echelons of command and management, authority to obligate and expend Government funds is subdivided and delegated in the form of allocations to major commands, administrative and technical services, and other operating agencies of the Army. These agencies in turn subdivide the allocation and delegate the obligational authority in the form of allotments to their subordinate installations and activities. The installations and activities then incur obligations under this authority, limited as to amount, by hiring of personnel, procurement of consumable type supplies, issuance of purchase orders, etc., required in the accomplishment of their missions. Previously the installations received only

a minor part of their supply requirements in terms of funds. Much of the materiel which they used was provided by free issue from depots. Under the Financial Management Plan, the consumable operating supplies are capitalized within the Army Stock Fund, and when issued for use, require reimbursement from appropriated funds. Therefore, additional funds must be provided the installations so that this reimbursement can be accomplished locally and reflected in the budgets and accounts of the installation.

Hence, the term "Consumer Funding" simply reflects this expansion of funding methods to provide, to the maximum extent practicable, that installations receive funds to cover all their requirements for resources.

Consumer funding places the responsibility of control and administration squarely upon the shoulders of the consuming operator. Reduced to its simplest terms, the concept provides the operator with an annual program. Against this program he prepares a time-phased financial plan. Funds are allocated, on a broad base, against this financial or budget execution plan; such allocations to include funds for purchase of all common consumables. The stock from which he purchases is carried in a revolving (stock) fund which facilitates appropriate stock levels to meet consumption demand since funds for replenishment are derived solely from sales.

Consumer funds are one-year funds, that is, they are appropriated each year through the budget process by the Congress. As was previously explained, they are allotted and suballotted through appropriate channels to the user. The principle of providing funds to the consumer rather than to the initial purchaser offers obvious advantages from a management standpoint. Mission, resources, and decision are welded together in the improvement of operational performance through assignment of specific responsibilities for the evaluation and control of the cost of labor, supplies, and services by those who actually cause the expenditures to be made.

f. Integrated Accounting. Although the statement is somewhat overworked, it is nevertheless true that "accounting is a tool of management" and more specifically, of financial management. A good accounting system and its end-product,

the financial reports, are absolutely essential to effective financial management. However, the effectiveness of management depends largely on the skill of the managers in using the tools provided them.

Early in the program of accounting improvements, it was recognized that in order to organize the accumulation of financial data into some logical pattern the Army would have to revise completely its approach to accounting and alter its basic accounting structure to meet the needs of the modern Army.

Until very recently the Army did not have a single comprehensive system like a big business would have, but a number of unrelated systems developed for specific purposes. These systems fell generally in the following categories:

- (1) Appropriation accounting, which was administered through two Armywide systems, one dealing with the control of allotments or obligational authority, and the other with the disbursing or cash side of the picture.
- (2) Working capital fund accounting, which consists of a group of special purpose accounting systems for use at industrial or commercial type activities or for funding inventories of certain types of materiel.
- (3) Property accounting, which in the past was in terms of quantities.
- (4) Operating revenue accounting, a number of special purpose systems for use at revenue producing activities, such as commissaries, sales stores, post communications offices, etc.
- (5) Cost accounting, which consists of a number of specialized systems for accumulating operating or unit costs.

These systems evolved over the years as the specific requirements or need arose, without the benefit of an overall departmental policy on accounting that recognized the inherent relationships between them. As an example of such relationships, consider the accounting for property, which in itself involves certain techniques and methods not generally applicable to appropriation or cost accounting. When it is realized that the receipt of the property is the result of a pur-

chase from appropriated funds, and the issue of the property for consumption results in an operating cost it can be seen that a definite relationship exists between the systems.

Because they were not designed around a common structure of accounting policies and were administered under different sets of rules, the systems did not reflect the full effects of transactions. With a few exceptions the various systems were not reconcilable, and the resulting information could not be consolidated or summarized for review at various levels of command.

The Integrated Accounting System, another element of the Financial Management Plan, consists of two parts. One is the financial and accounting structure for the Army as a whole. The other consists of the subordinate systems used by installations and activities in administering their parts of the Army system. *For example*, an industrial fund activity at a specific field installation must be provided with an accounting system that can be used by the operator in running his establishment. But sight cannot be lost of the fact that the activity is a part of the Army and the complete picture at the top levels must include the data pertaining to that activity. Similarly a stock fund does not exist as an entity completely separate from the Army. The stocks it controls are Army stocks and, together with other Army stocks, must be included in any overall statement of the Army's assets. The same principle applies to other aspects of accounting.

In effecting the integration of accounting and bookkeeping operations, certain basic policies have been adopted as to how and by whom they will be conducted.

One is that accounting operations are a responsibility of command. Only as it becomes a day-to-day operating responsibility of the managers can it be of real use at operating levels. It is not intended to create an accounting superstructure. The operating official is accountable for the resources made available to him and is responsible for their effective and economical use in conducting operations. Therefore, it is only logical that he be provided with the means by which he can measure his own effectiveness and that of his subordinates.

Related to this is the policy that the accounting will be decentralized, that is, it should be performed as close to the source of the transactions as practicable and not duplicated at higher levels. This point at which the accounting takes place becomes the basic accounting unit or entity. Financial information is generated at that level and as it proceeds up through the organization it is summarized and resummarized. Accounting operations at higher levels are concerned only with those transactions taking place at that level. Otherwise, accounting operations at those levels consist mainly of reviewing and consolidating reports.

In general the basic accounting entity is the installation or its equivalent. Subsidiary records in which are recorded the details of a specialized nature may in some cases be maintained by the operating activities. *For example*, subsidiary inventory records are maintained by supply offices and certain cost records are maintained by the operators where day-to-day information is needed.

Disbursing and accounting functions are combined at the installation level so far as feasible, with disbursing becoming a function of command. This involves the establishment of a simple and flexible organization and the related integrated procedures.

One of the basic policies established is that accounting is conducted under double entry principles. By applying this principle through modern accounting methods, the various systems can be tied together. The inventory accounts become integrated with the cash accounts, the fiscal accounts, and the cost accounts without disturbing the inventory accounting classification and results.

One of the important final products of the integrated system is cost data. The cost represents the total outlay of resources applied in carrying out a specific program, function, or project; in the manufacture of a specific product; or in rendering of a specific service. Based on the above definition, the cost accounting aspect of the accounting program is divided as follows:

- (1) *Program cost accounting.* The accumulation of costs or expenses classified

as to program, mission, function, activity, or organization; *for example*, the cost of the defense of the Panama Canal, Europe, or Korea.

- (2) *Production cost accounting.* Costs of goods produced or services rendered, including the determination of unit costs, such as the cost to launder a shirt, or to produce a round of ammunition.

It is the former type of costs to which we refer when discussing cost of performance budgeting. It is the relating of these costs or expenses to the functions, activities, and programs that will make cost of performance budgeting possible. In order to use such data to support fund requirements, it is essential that the cost accounts be maintained under accounting controls and procedures that will permit the ready conversion of costs as such to obligations which are the basis of fund administration. It is obvious that this can best be done through the mechanics of an integrated system.

Production cost accounting is being applied in connection with industrial fund activities, where it forms a basic part of the industrial or commercial type accounting system. It is possible and sometimes desirable to apply production cost accounting to operations financed by allotments of appropriated funds. *For example*, production costs could be obtained in connection with the operation of a hospital, laundry, or bakery financed by allotments, even though some of the other advantages of an industrial fund are not present. Subsidiary production cost systems will be established at parts of the installation accounting system where it is determined that the data obtained justifies the effort to obtain it.

There are further advantages for supply management in the integrated accounting concept:

- (1) It facilitates the administrative control of appropriations. The fund accounts are more accurate since obligations are adjusted promptly upon payment. This frees funds otherwise tied up by unavoidable overestimates of obligations. In addition, the system itself encourages better bookkeeping

through the automatic checks and balances of a double entry system.

- (2) It reduces the reconciliation problems. The heavy burden of reconciling the fiscal accounts with the expenditures reported by the Finance Corps through disbursing offices and regional accounting offices is eliminated. Agreement between the cash and allotment accounts is proven automatically and currently through the normal operation of the system.
- (3) Duplication of accounting effort is eliminated. Disbursing becomes a function of the command; the duplication of voucher examination and detail accounting for expenditures is eliminated. The command has control over the payment of its bills.
- (4) More reliable information is available for budget purposes. Program cost estimates can be derived from the subsidiary cost ledgers. Other subsidiary ledgers reflect the resources on hand to execute these programs. Budget execution is based on cost control as explained earlier. Fund control is exercised in broader categories.
- (5) The greater ledger provides a Statement of Financial Condition and a Statement of Operating Results for overall management analysis.. The Statement of Financial Condition reflects the values of cash, receivables, inventories, and other assets, as well as payables and other liabilities and the Government equity accounts. The Statement of Operating Results reflects operating expenses and capital outlays together with revenues from sales activities.
- (6) Cost accounts will furnish operating and staff officials with cost information, the integrity and reliability of which are insured by general ledger control accounts. These cost statements can be used for comparison of actual with budgeted or standard costs as well as for other forms of analysis.
- (7) Benefits accrue from the centralization of control over the billing and collec-

tion operations resulting from credit sales activities. There is greater assurance that all amounts due the Government are properly collected and accounted for.

- (8) Probably one of the most important advantages of the system and the related organizational structure is the flexibility to meet changing management and budgetary needs. An alert and imaginative management is constantly in search of financial facts bearing on its problems. This program is designed to provide the managers with a system that can be responsive to their needs and an organization that can interpret the accounting and financial data in terms of management significance.

g. Financial Reporting. It was stated in the preceding discussion on Integrated Accounting that financial reports, the end product of a good accounting system, are absolutely essential to effective financial management. Under the Army Financial Management Plan, the term "Financial Reporting" has been applied to the design and utilization of these reports reflecting financial operations and status of all activities regardless of how financed.

It goes without saying that any system of financial reporting must be designed primarily for the use of the operator rather than the accountant. An accounting system is like an iceberg. Ninety percent or more is concealed from the view of operating officials. The ten percent that can be seen is exposed in reports and analyses. To the operator, the entire system is nonexistent if the produce intended for his use is not useful.

h. Internal Audit. As a part of the plans for improving financial management, the approach to auditing within the Army has been changed to make it a more effective tool of management. Most of the audit improvements are embodied in the Internal Audit Program.

Internal audit is the independent appraisal activity within an organization for the review of the financial, accounting, and related opera-

tions as a basis for protective and constructive services to management.

The commanders at all installations each with the responsibility for large sums of money and large stocks of materiel running into many millions of dollars need to know that these assets are being properly accounted for and safely guarded. They want to be assured that their stewardship would be given a clean bill of health no matter what kind of an investigation might be made. This assurance is given by means of a periodic audit conducted by disinterested persons similar to the prevailing practice in private industry.

The need for the audit becomes greater as the resources increase in amount. To illustrate the increase in size of the Army organization, expenditures for military purposes for FY 1934 were about \$269,000,000. In FY 1953 such expenditures were roughly \$16,000,000,000 thus being about sixty times what they were in 1934. Programs have also increased in complexity and diversity. The Army is really "big business."

Industry took the leadership in establishing internal audit organizations, and top management of large corporations now look upon this service as an important factor in the efficient administration of any large-scale business.

Internal auditing determines whether adequate control and protection of the Government's and the Army's interests are being maintained. It is primarily concerned with such matters as the adequacy of and compliance with procedures, reliability of accounting and statistical data, protection of assets, and the effectiveness of internal controls. Accordingly, it is important and useful to management at all levels because the conclusions based on actual conditions are available to assist the commander in achieving more efficient administration of his operations.

Internal auditing in the Army is performed by the Army Audit Agency to assure independence and obtain more economical and efficient operation. Audits are usually made annually on a comprehensive basis to cover all financial operations of the installations. In lieu of the account audits which were made in the past, "installation type" audits are performed cover-

ing all financial operations at each installation. The installation type audit involves a functional area approach instead of an individual account approach.

Internal auditing is a supplement to, not a substitute for, personal attention by appropriate levels of command. The commander has the responsibility for supervisory reviews, checks, and inspections to insure that adequate internal controls are installed and are functioning properly.

The normal verification, balancing, and reconciling process are an integral part of the systems of accounting and internal control, and for the most part should be accomplished by operating personnel on a day-to-day basis.

i. Conclusion. The Financial Management Plan, taken as a whole and with all components implemented fully, makes possible within the Army what might be termed management-in-depth extending from the Department of the Army to the installation and back as the broad missions of the Army are fulfilled.

The plan is intended to make possible the placement of financial responsibility and the means of discharging it equal to the present authority of the installation commander. Under this concept, the commander receives funds, so far as possible, for all of his financial requirements through Consumer Funding. This means a programming, budgeting, accounting, and reporting system, as well as a supply management system, that matches the management task facing him. He then programs the work and budgets the costs at the installation, relates them to funds required, obtains Army command advance approval in these terms, and reports on the relationship of costs, as incurred, to funds obligated and work performed.

There must be assurance that cash accounting, financial accounting, cost accounting, and property accounting are properly and accurately interrelated according to accepted accounting principles and practices. This insures that the figures used by all echelons of command are consistent, reconcilable, and reasonably accurate. Therefore, Integrated Accounting has been provided as well as the independent appraisal by Internal Audit.

Seeing the Financial Management Plan in this perspective and as a complete reality, it is evident that, though the installation commander's authority remains unchanged, he is much better equipped to discharge his responsibilities.

It should be emphasized that the systems and techniques outlined are not comptroller systems. They are the commander's systems. Under the American way of doing business, it is accepted that when a machine tool, *for example*, is no longer able to meet competitive production requirements, it is replaced promptly. The Army is replacing its outmoded and ineffective management tools, and, like business, will find it profitable to do so.

It is not an easy job. If it were, it would have been done a long time ago. Comptroller organizations were established primarily to do this job of modernizing the Army's management tools—to make them fit the needs of the largest and most complex of organizations. In any important undertaking, such as this one, there are many problems to be solved, many setbacks and disappointments to be overcome. No man knows all the answers, but collectively the answers can be found.

The plan is aimed at improving the commander's control of his operations and resources. It will do this if the responsible officers and civilians, in discharging their normal command and staff responsibilities, view the plan as an opportunity to achieve better management control.

2. Budgeting and Funding

The budget processes in the Army are an integral part of management control and the budget represents a financial plan for the operation of the Army establishment. It must be based not only on known or foreseeable factors, but also on assumptions as to unpredictable elements. In an organization such as the Army, whose activities are distributed geographically throughout the world, and cover a wide range of diverse functions, the preparation of budget estimates as the basis for request for funds is a task of great magnitude and complexity. Although the budget formulation process is in some respects inseparable from the broader field of executive planning and direction, it is clear

that the work of budget preparation consumes in itself a considerable portion of the time and energy of the people available for administration of the Army.

The President's annual budget, which pertains to all executive agencies of the Government, is the structure through which money is made available for financing the needs of the Army and is an important element in the development of an effective system of financial administration. In general, money is made available by the Congress in the form of appropriations or revolving funds, all of which are within the General Fund of the Treasury.

There is, however, another type of budget, which is more common to industry than the Government. It is sometimes called an operating budget or cost budget. This type of budget relates costs or expenses with particular subordinate organizations, units, functions, or processes. It budgets the cost or expenses in terms of resources used in operations rather than in terms of money needed to buy things. For a given period, it includes money to be spent for goods and services used during the period, plus the value of goods to be used but purchased previously. It excludes the money to be spent for goods that will go on the shelf and be used later.

This type of budget is related more closely to day-to-day operations than the fund or appropriation budget. It establishes estimates and forecasts of costs by unit, function, or operation which can be related to workload and used as a management device in controlling operations. Actual costs, as determined by the accounting processes, can be compared with the forecasts. Any that are out of line serve to direct attention to an operation that might require investigation by the responsible operating official.

We are therefore dealing with two types of budgets—one is in terms of money needed for buying goods and services, and the other is in terms of costs of programs, functions, organizations, and activities. The former can be compared to the need of a business concern for cash in the bank. The latter is the budget used by the operating officials in their day-to-day operations.

There is, of course, a definite relationship between the operating expense budget and the cash or appropriation requirement. Eventually all operating expenses or costs are met from appropriations. The difference between the two types of budgets lies in the timing, principally because supplies and materials may be purchased during one fiscal year but will not be used until a subsequent year at which time they become part of that year's operating expense. Therefore, a fiscal year appropriation budget may be greater or less than the operating expense budget to the extent that we are either building up stocks or living off the shelf.

The Army Financial Management Plan provides for a cost of performance budget which is designed to tie these two types of budgets together. In oversimplified terms, this consists of presenting the costs of goods and services to be used, the value of capital goods to be received or added, planned changes in inventory position, planned changes in onorder position, and adjustments, which together reflect the funds required to finance the program. Supplementing the fund requirements are the statement of proposed resources and finances, such as funds available, receivable, or reimbursements anticipated, and the new authority required. These essentials are outlined in terms of the primary program structure of the Army. *For example*, in presenting the justification for the maintenance and operation fund requirement, the operations expense budget is considered first. This budget provides a common denominator for measurement and comparison of work done and affords the means of obtaining cost factors and forecasting the year's expenses. By adjusting these figures by the anticipated increase or decrease in inventories and undelivered orders, it is possible to arrive at the fund requirements, or what is technically known as the obligation authority required.

It is necessary also to provide for central financial control of procurement and stock levels of consumable or operating materiel even though such materiel is charged to operating expenses when it is issued for consumption. The use of revolving funds for the procurement and holding of such materiel facilitates this central financial control, and simplifies in some respects the cost budgeting and accounting

processes in connection with the cost of performance budget concept.

Preparation of the Army's budget under the concept outlined above is accomplished in two phases. Formulation of the annual budget for the Congress is the responsibility of the Department of the Army General Staff. Detailed budget estimates are not required from the operating agencies although major commanders submit statements which assess the implications of the program guidance for the budget year against operating results of the current year. The second area of budgeting is budget execution, that is, the administration of the Appropriation Act which is the concern of all levels of command. Based upon program documents and schedules, revised to reflect Presidential decisions, as set forth in the Budget to Congress, each operating agency submits a Budget Execution Plan formulated on the basis of subordinate installation operating budgets.

In this manner participation of field agencies in the annual budget process becomes meaningful. The timing, preparation, and submission of these budget execution plans allow their preparation in operational planning terms for the ensuing year and their submission to serve as the proposed distribution by the operating agency of pending appropriations.

One of the important objectives of the program to improve budgeting and funding is to make the funds available in broader categories, ideally at the appropriations level, thus permitting more flexibility in the use of funds by the operator. This envisages a budget in terms of costs and an evaluation of the results in the same terms. Such a cost budget would not rigidly limit or control operations in the manner that is used in connection with allotments of funds where every transaction must be certified as to the availability of funds for the particular project involved. Cost control, as distinguished from fund control, involves the comparison and

evaluation of actual costs against planned costs. Actual costs may run over or under the planned costs for particular activities or projects and may be justified by the conditions arising in the day-to-day operations. This does not minimize the importance of fund control, but the control of funds under this concept can be exercised without needlessly hampering operations. Under this plan, fund control is exercised at the installation level by the installation commander. Each organizational element of the installation operates against a cost budget which originates with the operating head of the organization. A program and budget committee reviews the cost budgets and furnishes the operating official with information as to its approval or any changes made. After the installation has agreed on its operating budget for the year, the commander's staff computes the fund requirements and prepares the budget execution plan. Practical application of this concept is demonstrated in the Depot Command Management System which will be discussed in a subsequent portion of this chapter.

The Army's objective in the budget area is to have a system in which each stage of planning and execution with respect to programs and activities is paralleled with financial planning for the resources involved, and to have this process followed at all levels in the non-tactical area. In short, to have a cost of performance budget in being and in use at all levels. The basic assumption is that the best utilization and control of resources will result when the program and the budget are developed in the same terms, and when the budget reflects all resources to be used in carrying out the program, and when the commander or manager at each level accounts in his budgetary reports for managing his resources in relation to program accomplishments, and in relation to budget estimates. The program and budget then must be married at all levels in order to achieve this objective.

E. MANAGEMENT CONTROL OF OPERATING COSTS

1. Introduction

Equally with operation at minimum inventory levels, this manual has stressed the importance of close attention to the operating costs

of the supply system and of the effort to reduce these costs to the lowest practicable level. The possible savings in this area are considerable. *For example*, if a figure of \$6 billion annual

issues is taken for illustration, the cost of "selling" these supplies would be 25% of the cost of the supplies themselves. This is a considerable "selling cost." Furthermore, almost all the elements of operating cost for the Army supply system are variable costs; that is, they change directly with changes in the scope and volume of supply operations. Over 75% of these costs in fact consist of the civilian payroll. The Army has very few of the "fixed costs" which are virtually an irreducible element in the costs of most commercial distributors. These include depreciation of buildings and equipment, property taxes, and other costs of a similar nature. Since the Government charges all costs as expenses, the degree of flexibility in operating costs is far greater than for any comparable commercial operation.

2. Commodity Allocation

The introduction of financial inventory accounting, together with the commodity class concept which is one of the bases for such accounting, raises major problems for the effective use of operating cost figures. Following the basic supply concept of commodity management and organization, this manual has considered a number of supply management decisions on a commodity basis and has discussed criteria for each decision in terms of commodity costs, including operating as well as inventory costs. Typical of such problems are the determination of wide or restricted stockage of items and classes, the question of procurement or bulk transfer of excess stocks at any storage location, and the decision to delegate or to centralize supply responsibility for groups or classes of items. It has been noted that the effect of reducing excessive inventories and increasing stock turn rates is not only to avoid tying up the Army's appropriations in goods that are not needed but also to reduce operating costs by eliminating the cost of storing and handling these inventories. Storage costs, however, do not necessarily increase or decrease in direct ratio to changes in inventories for all commodities. As excess inventories are reduced, for instance, storage costs should decrease at a somewhat faster rate than the inventory because of increased efficiency in locating, storing, and handling goods. Also the present storage

cost breakdowns by the broad commodity groupings of the technical services demonstrate that there are considerable differences in storage costs for different types of commodities. In a sample taken at random, the costs of care and preservation in storage for the technical services in the third quarter of fiscal year 1953 ranged from \$1.34 per ton for the Transportation Corps to \$21.63 per ton for the Signal Corps. Most if not all of this range of more than 1500% must have been due to the different types of commodities handled by the technical services. Clearly it costs far less to store rails than radio tubes. In many cases, a differential of this kind will be of central importance in making and appraising supply management decisions. Where storage costs are extremely high, turnover rates and maintenance of minimum inventories will be of correspondingly greater importance.

These considerations, together with others which will be discussed later, suggest the importance of collecting and reporting operating costs on the same commodity basis as the dollar reporting of inventories and the commodity units of the supply management organization.

As inventories are reduced, however, the measurement of operating costs assumes greater importance. The decision between minimum levels of three or six months' supply for an item or a commodity class or an optimum stock turn rate of four or two, for instance, may be very largely a matter of balancing elements of operating cost to achieve the smallest overall cost of supply for any given commodity or item. Also, many present management programs are aimed directly at decreasing the operating costs of supply, such as the reduction of interdepot shipments. Planning, execution, and effective measurements of these programs depend upon reporting of the cost savings actually achieved.

3. Categories of Operating Costs

a. General. The categorization of commodity operating costs which will provide the most useful measurements in the problem areas of supply management follows for the most part the present overall categories established for individual depot reporting. These categories are discussed below, together with certain modifications and additions indicated by previous

discussions in this manual. The application of these cost categories to supply management operating and control problems can also be suggested in exemplary or general terms, but will of course be subject to extension and modification in practice, leading perhaps to more effective methods of categorization.

b. Storage and Preservation Costs. As indicated above, these costs are of vital importance whenever local or national quantities of inventory are under consideration. *For example*, they affect decisions to transfer stocks between storage locations, to permit attrition at one location, to use open end or call contracts, and to set retention levels.

c. Shipping and Receiving Costs. While these handling costs are small relative to storage costs, they provide an excellent index of the volume of traffic in receipts and shipments and are closely related to transportation costs. An upward trend in these costs while inventories remained relatively constant would indicate an excessive frequency of deliveries and shipments and the need for re-examination of local operating levels.

d. Administrative Costs. These costs should represent the direct charges of documents processing, reporting, stock and supply control, procurement, and other functions associated with each commodity group. Consolidation of such costs incurred at depots, with costs of inventory control points and procurement agencies, should provide a means for measuring the effect of improved processing and reporting methods, for determining the workload involved in extract action, set assembly, and condition and account coding, and to assist in deciding the optimum frequency of review and reorder.

e. Transportation Costs. The costs of transporting things must also be consolidated with the other operating costs of supply. We have seen that these costs are often fundamental factors in decisions of supply management. The question of keying and distribution, for instance, and the whole problem of determining depot service areas and missions must be approached to a large extent through analysis of economical transportation patterns. As an element of control, transportation cost data will indicate the effectiveness of local supply plan-

ning, the extent of backhauling, and the advisability of delegation to local procurement authority.

f. Maintenance Costs. The costing of maintenance operations and its relation to supply have already been discussed.

4. Procurement Differentials

While differences in prices paid for the same commodity cannot strictly be considered as operating costs or savings, they are frequently influenced by methods of supply and must be balanced against the corresponding differences in elements of operating costs. Procurement prices must first be distinguished from the inventory valuation under the present financial inventory accounting system. Of the number of possible methods of valuing inventories, the Army is using the standard price system, under which all units of a given item are valued at the same standard price and adjustments are made periodically to reflect intervening price changes. While accurate pricing of inventories is important for balancing accounts, it is secondary for present control purposes. The important point for control is that the *relationship* between item values in any commodity group or between commodity groups reflects the actual relative costs of the items or groups. So long as this relationship remains constant, financial inventory reports will provide effective data for control purposes. With the advent of consumer funding, pricing of individual items has become far more important.

Procurement prices, on the other hand, may fluctuate both with market conditions and with the choice of different types of supply action. These fluctuations are more closely related to operating costs than to inventory values. Previous discussion on procurement has pointed out the counterbalancing effect of premium prices for local, open end, or call procurement as against the savings in operating costs which these procurement methods can bring about. Procurement savings for larger orders must be measured against the costs of storing the goods until they are consumed. For control purposes, such considerations indicate the necessity for collection and application of procurement prices against other operating costs for items and com-

modities in order to arrive at the lowest total cost to supply.

5. Accuracy of Cost Data

It must be recognized that the collection of cost data on a commodity basis will present certain accounting difficulties. All cost figures which are used for accounting purposes must be subject to checking for complete accuracy. When the same figures are used for control purposes, however, the requirements for accuracy vary with the degree and nature of the control and the ensuing action. The determination of economical order quantities, for instance,

requires a figure on "cost to hold," which consists largely of the storage and preservation cost element discussed above. If the choice is made between a three months' and a six months' order frequency, a very rough approximation of the cost to hold figure—on the order of 10% to 15% of inventory costs—will be enough to indicate the desirable alternative. Exactly how much is saved by the choice must wait for exact accounting records. Control and accounting have different objectives, and it may often be possible to derive approximate figures for the guidance of management action when accounting data have not been or cannot be fully developed.

F. INTEGRATION OF MANAGEMENT CONTROLS

1. Introduction

The preceding sections have discussed financial and quantitative control and the control of operating costs of the Army Supply System. A number of relationships between elements of these costs have been indicated as important for control purposes. It is not until measurement of all elements is combined and the degree of supply economy is itself measured against supply performance that the delegation of responsibility to individuals and activities and the control of performance under that responsibility can reach their full effectiveness. The fixing of minimum inventory levels has been frequently discussed and may serve as an example of integrated control. In the present situation, a commodity manager may often find himself in an excessive inventory position. As he strives to reduce inventories by cutting back orders and disposing of excess items, his operating costs should generally decrease along with his inventories. Storage costs will go down, transportation costs may be reduced through better balance of the remaining stocks, and administrative costs will decrease as the job of reporting and reviewing stocks improves. Supply performance will improve along with improvement in stock distribution. As inventories continue to decrease, however, and the turnover rate goes up past a certain point, deficiencies in supply will begin to appear again. Overall inventories will be too small to sustain demand, backorders will increase, and supply

service to consumers will fall off. Procurement costs will go up with emergency demands and the general administrative costs of keeping ahead of these demands will show the largest increase of all. The task of operating control by the commodity manager and of management control by the levels above him is to determine the point at which economical operation combines with optimum supply performance to obtain the most satisfactory work from a particular segment of the supply system. Such a determination is impossible without combination and recombination of all measurements into an integrated control picture. If attention is concentrated upon one element alone, such as inventory position, the operating manager will naturally concentrate upon that element and neglect other aspects of his operation where control is nonexistent or less exacting. The overall result may be no improvement, or in fact a decline in efficiency.

The scope of management responsibility for integrated control of the Army Supply System can hardly be overestimated. Commercial distribution managers are subject to the almost automatic controls of the market. If their inventories are long and their operating costs increase, their customers are free to go elsewhere. Their competitive positions suffer, sometimes to the extent of personal or business failure. There is no means whereby the Army can or should duplicate this ultimate commercial incentive. Its consumers must depend upon the supply system and upon a

designated source within the system for what they receive. The responsibility of the system for effective and economical performance is to the military service and to the nation as a whole. Integrated management control must fulfill the heavy task of substituting for immediate business incentives both the restraint and the urgency of the national interest from the highest to the lowest levels of the supply organization.

2. The Depot Command Management System

The rewards of integrated control are equal to the responsibilities. It makes possible within the supply organization the assignment of clear and subdivided authority and responsibility for manageable parts of the supply mission, together with control of the means to carry out such missions. The Army has achieved such integrated control in its supply function through the Depot Command Management System. This system provides unity of command, financial management, and control of operations at Army depots.

Unity of command is achieved by the establishment of one installation command receiving direction and reporting through one command channel, with the responsibility for accomplishing all missions in either a general or branch depot. Depot commanders in turn establish definite internal responsibility areas within their installations. The dual command system between technical service chiefs and Continental Army commanders, and the autonomous status of the technical service supply sections in general depots has been eliminated.

The Depot Command Management System is an integrated programming, budgeting, funding, and accounting system under which the Army's depot business is controlled programwise by giving a technical service and its depots specific programs to be executed, and providing the necessary overall resources, unencumbered by piecemeal restrictions.

This depot management system was developed by a task force established in 1954 by the Deputy Chief of Staff for Logistics for the purpose of improving the financial management of the Army depot system. It was realized at that time that the depot management system was inadequate and reduced the depot commander to the role of a housekeeper. The basic problem derived

from the fact that the depot commander received his resources and was subject to controls from multiple authorities. Management was further complicated by the limited relationship that existed between the various systems employed to satisfy these multiple authorities. A most important shortcoming was the lack of a control document, an operating program, which would indicate the work to be done and the resources available to complete it. The shortcomings were classified into three main categories to facilitate analysis and correction. These categories were: funding complexities, command problems, and lack of motivation of command.

Funding complexities were caused by the Army's method of implementing existing statutory provisions and by the practice of multi-source funding. The depot commander received funds, was subject to restrictions imposed by, and reported utilization to, as a bare minimum, the CONUS Army, the chief of technical service, and any management or control groups within the technical service, and in the case of general depots all tenant technical services. This problem was solved by placing depot installations under complete technical service control and assigning to the chief of one technical service full responsibility for accomplishment of the missions assigned to a general depot. This action resulted in single allotment funding, the significant feature being that an operating agency (technical service) issues to an installation one bulk allotment of funds per appropriation to cover all installation operating costs, in conformance with and subject to an approved operating program.

The command problem was caused by the split responsibility of CONUS Army commanders and technical service chiefs at installations and by the autonomous status of technical service supply sections at general depots. Unity of command has been achieved under the Depot Command Management System by assigning the depot commander complete responsibility for his depot program and requiring him to report to only one commander. At branch depots the system requires that the depot commander be responsible for execution of his program to only one element of the office of the technical service chief. Any management or control groups within the technical service may continue to control their own

programs, but they must assign the depot workload through the element which is charged with the responsibility for overall depot management. At general depots the depot commander is charged with the responsibility for the performance of all missions and will report only to the chief of one technical service. This technical service chief acts as executive agent for the tenant technical services who have work programs assigned to the general depot. Each technical service submits to the executive agent operating program information, workload data, and schedules for their missions to be performed at general depots. These requirements are incorporated into his budget execution plan and included in his program directive to the general depots. The general depot commander in turn submits his depot operating program to the executive agent, who coordinates the approval of a general operating program with interested technical services.

The problem of lack of motivation that existed in the original depot management system stemmed largely from the lack of an operating program. The commander had no consolidated operations program from which he could operate and plan. Many times he was months in securing the program for which his depot was responsible. The Depot Command Management System rectifies this old shortcoming by providing the commander with an operating program. The commander is instrumental in its formulation and is charged with the responsibility for its execution. The program provides him with an objective. The system gives him the authority required to discharge his responsibilities and provides one commander to whom he looks for direction and who evaluates his performance. In this manner the depot commander has been elevated to true command status.

The operating program is of paramount importance in the operation of the Depot Command Management System in that in addition to being the instrument from which required resources are determined, it provides a double management control. The control features are that workload performance can be directly related to programmed work and actual costs related to programmed costs. Thus, program control is substituted for a reduced degree of fiscal control.

The depot operating program indicates the work assigned the depot as missions and the labor, supplies, and equipment which support the missions. The depot commander prepares, and submits for approval, his operating program based on guidance received from the executive agent and locally generated information. The program is divided into mission areas and support areas. These areas are further broken down into functional or category groups. This area-and-function structure is used in developing a priced program showing work to be done and resources to be consumed in accomplishing it.

Based on the program guidance of the technical service chief, the depot commander estimates the workload under each function and applies a program cost factor to the workload estimate to arrive at a direct cost for the function. In this manner he arrives at a total mission area direct cost. To this is allocated the appropriate portion of the distributed support costs. The total cost is then adjusted by changes in resources on hand and on order and changes in existing liabilities to arrive at the value of the program to be funded. In this same functional breakout, manpower requirements for each function are indicated. In this manner, an operating program is compiled which can be monitored under these elements of control: workload, cost, and personnel utilization. The operating program provides the basis for a cost of performance budget which indicates the net fund requirement as a product of cost adjusted by changes in resources and liabilities. When approved by the executive agent, the program, together with supporting funds, is returned to the depot for execution.

The executive agent evaluates each depot commander on his performance of the total depot missions by application of the principle "management by exception." This is achieved by establishing variance or tolerance factors for "the scope of workload" and "unit cost of performance" elements of the program or in other words, limits the degree of deviation of the actual workload and unit costs versus the programmed workload and unit costs. The executive agent regulates the degree of control by varying the limits, plus or minus, of the variance or tolerance factors. Deviations exceeding limits require de-

tailed explanations in reports. The executive agent of general depots advises the technical services of the status of mission performance where their missions are performed in general depots. Technical standards and criteria of mission performance are prescribed by the mission agency.

Reporting is effected on a pyramidal basis, providing detail as required at the operating level and minimum summary data to the successive higher echelons. The basic external reports are the operating program reports which contain the necessary information for develop-

ment of summary operational comparison, trend, analytical, and financial control data.

It is apparent that the Depot Command Management System is in essence an integration of the control elements made possible through the Army Financial Management Plan. The management principles and methods described are not new to the experienced manager. The real value of the system, or for that matter any administrative system, is related to the degree that supply management personnel apply their ability, effort, and knowledge in implementing the system.

PART III
PRINCIPLES FOR THE SUPPLY MANAGER
CHAPTER 10
A SUMMARY OF SUPPLY MANAGEMENT OBJECTIVES

A. ECONOMY OF SUPPLY

The compelling need for economical operation and economical inventory levels in the Army Supply System has been restated and reinterpreted for different aspects of supply through this manual. The constant level of military preparedness required by the world position of the United States, together with the increasing rate of technological development in weapons and equipment, create a situation in which military expenditures could easily endanger the stability of the nation's economy. This situation is new in the history of this country, and it is not surprising that the methods and concepts of supply which have served the Army with consistent success in the past are not wholly adequate to meet it. The emphasis has been upon individual responsibility for economical use of the few available supplies in peacetime, and upon unsparing effort to supply troops with everything which they could possibly use in time of war. Incentives have not existed which would apply pressure for supply economy in a military establishment too widespread and complex for adequate control of the individual item or the individual consumer. The Army has recognized the need for adapting its supply methods and concepts to this new situation, and has developed the necessary tools to promote and control overall economy of supply. These include the techniques described in the preceding chapters, such as operating cost statements, the Financial Management Plan, and the Depot Command Management System. These tools provide for the first time adequate measurement of supply economy in the form of costs: the cost of operations, of personnel, and of inventories.

The data and measurements provided by the techniques of financial management, however, will not automatically produce economy of supply. Informed and effective use of such data is required of individual managers at every level in the supply system. This manual has presented many examples of such uses, and has indicated how the demands of supply management must control the form and methods by which the data are presented. But it is impossible to anticipate in detail all the information demanded by management or all the decisions which management will take as a result, especially in the present situation where new techniques and concepts are in vigorous development. A continuing and analytic attention to the objective of supply economy is the responsibility of every supply manager.

The first chapter of this manual has stated that "dollar savings will come when supply managers are cost conscious, and cost consciousness is a way of thinking about the supply process." In a supply system as complex as the Army's, this way of thinking is neither easy nor obvious. It is not merely an application on a wider scale of the traditional emphasis on individual care and discipline in the use of military supplies. It is true, and has been widely stated in this manual that generally a trend toward simplification of supply operations, whether in document processing, reporting, or movement of materiel, is also a trend toward economy. But any such simplification must take into account all operations and activities that may be influenced by it. In the discussion of set assembly in chapter 3 it was pointed out that the extreme of simplification in this field

would be to reduce to a set designation the entire range of equipment needed for any given unit. This would provide the utmost simplicity in tables of equipment, and would appear to provide the utmost convenience to the user. But it would also raise intolerable complexities in the supply of individual items, and would result in greatly increased duplication and waste of materiel. From the point of view of economy therefore, any simplification of the supply process must be evaluated in its overall effect. Will it increase or decrease associated procurement costs, transportation costs, storage costs, and all the other elements that go to make up the total cost to supply? Can it be made to work under war conditions? Economy of supply management can never be achieved merely by adding together a number of independent improvements or economies in parts of the supply operation. These parts are dynamically related to each other; economy in one may easily be the direct cause of wastefulness in another; and it is not the best use of management effort to determine the most efficient way of doing something that should not

be done at all. Cost consciousness on the part of the supply manager therefore involves a knowledge of the whole supply picture with all its various and sometimes conflicting potentialities for improvement, simplification, and economy, and imposes upon him the difficult task of continuous appraisal and balance between these factors in his day-to-day supply decisions. Such an appraisal of the total efficiency of the Army supply system is clearly the responsibility of the top management of the Army; the effectiveness of new techniques, including financial management data, in assisting top management to meet this responsibility is indicated, for example, by the success of the Army in reducing expenditures to keep pace with curtailment of funds without impairing the effectiveness of supply. As more data become available, the same kind of appraisal, action, and review is being and must continue to be extended progressively, to the broad commodity groupings represented by the technical services, to commodity classes within the responsibility of each service, and finally to individual items of supply.

B. RESPONSIBILITY FOR SUPPLY

The objective of supply economy, as interpreted in this manual, requires the application of a second basic principle of supply management, the definition and assignment of supply responsibility. Maximum economy can only result from comprehensive analysis of all factors in any given supply situation, and such analysis is useless unless supply managers have the authority and the responsibility for taking action as a result. A manager at a stock control point, for example, may determine that the costs of storing and issuing a certain item through regular Army distribution channels are larger than the procurement premium which would be paid for the distributing of some item more directly to consumers under open end or call contracts. However, unless both procurement and supply action for the item are under unified control his corrective action cannot be direct. Following the traditional responsibilities of the technical services and current developments in the organization and concepts of Army supply, this manual has indicated that unified control is most effectively applied on a commodity basis, and has explored

many of the implications of commodity organization. Such an organization will not automatically solve all supply management problems; it will provide the means for top management to define and delegate responsibility for supply in such a manner that operating management can accept and fulfill its assigned mission of economical and effective performance.

It has been widely observed both in industrial management and in military operations that high morale and effectiveness of a unit or activity are usually found in conjunction with a clear understanding of the unit's mission, and a well defined responsibility for its execution. This principle applies no less to the activities of a supply system. Where individual functions are subordinated to a comprehensible and manageable task of supply, where the correction of deficiencies in accomplishing this task is within the scope of unit management, and where superior performance can be detected and rewarded, the prospects of successful operation are appreciably improved. The location of responsibility therefore

is more than a means for defining or measuring the operation of a supply activity; it is a positive

incentive toward excellence in performance for the individuals at every level of its organization.

C. MONEY AND MILITARY EFFECTIVENESS

Absolute dollar savings in the money spent by the Army, in the form of lower budget estimates or funds returned to the Treasury, are not the only aim of economical supply management. Economy also means obtaining the maximum military effectiveness for each military dollar. This second aim is particularly important at a time like the present, when economic limitations on the national budget may be as important as strategic requirements in determining the total funds available for the Army's activities.

The statement is commonly made that the Army runs on men, money, and materiel. Men and materiel are the essential elements which contribute directly to the accomplishment of the Army's mission. Money is a factor of a different kind. First, as noted above, it often limits, at least in peacetime, the gross numbers of men and quantities of materiel which the Army can use. Second, within these limitations, money provides a common denominator which makes possible control and balance among all elements of the Army's resources to produce the greatest possible effectiveness in the defense of the nation. It enables management to compare supplies against personnel, activities against other activities, one type of equipment against a proposed substitute. *For example*, military requirements may establish a demand for increased allowances of repair parts to troop units. They do not, however, establish the means by which this demand should be satisfied, or whether in fact certain changes in

maintenance responsibility and operation will provide equal or greater military effectiveness, without building up stocks of repair parts at the troop level. Only an intensive analysis of the *cost* of alternative methods of approaching the problem, together with the relative effectiveness of each method, will provide the basis for an informed decision. If the most effective method turns out to be the most costly, dollar analysis should again provide the means of weighing the increased military effectiveness in this area against the loss of funds and consequent decrease in military capacity in other fields. This kind of analysis is a step beyond mere dollar savings, however important such savings may be. It is a necessary step for all Army activities, and particularly for the activities of the supply system, where the largest portion of the Army's funds are spent. In default of such analysis, *for example*, budget cuts have occasionally been translated into cuts "across the board" in personnel or some other wholesale factor. This is a quick method of reducing expenditures, but it is most unlikely that it serves the interests of economy, or that it maintains the military capacity of the Army at the highest attainable level. Military effectiveness and economy therefore are not necessarily divergent or contradictory aims; the most effective Army is that which has made the most economical disposition of the resources available to it, and which faces its mission with the maximum concentration of combat strength which these resources will allow.

D. ACHIEVEMENT OF OBJECTIVES

Essentially, the task of management within the Army supply system is to develop sound policies and programs, and to carry them out in the most efficient and economical manner possible. Great strides toward the accomplishment of this task have been made, however, numerous areas have been suggested in previous sections of this manual wherein possible further economies may be effected. What savings in transportation will be made possible by greater consolidation of shipments and wider use of intransit privileges?

What economy will be realized by consolidation of technical service distribution areas? What savings will be realized by reduction of extract requisitions, shortage reports, and requisition paperwork? How can the capabilities of electronic data processing equipment and transceiver networks be further utilized to improve the efficiency of supply operations? Will a more dynamic inventory control system demand more responsive methods of procurement? What benefits may be derived from intelligent appraisal and

utilization of operating cost statements? Will analysis of such statements and comparison of the operations of similar installations and activities arouse command competition as a substitute for the profit and loss incentive in industry? These are only a few of the questions suggested in this manual; their solution is a challenge to the supply manager. He must evaluate through

painstaking analysis, each program in terms of its contribution to the overall Army objectives. He must assess the relative importance of all types of activities in order to achieve the best possible balance in the allocation of resources. The tasks have been outlined—aggressive, dynamic management is necessary to insure their accomplishment.

[AG 353 (31 Mar 58)]

By Order of *Wilber M. Brucker*, Secretary of the Army :

Official:

HERBERT M. JONES,
Major General, United States Army,
The Adjutant General.

MAXWELL^a D. TAYLOR,
General, United States Army,
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Arsenals (5)
PG (5)
Engr Div (2)
Proc Dist (5)
Mil Subs Sup Market Cen (2)

NG: None.

USAR: None.

For explanation of abbreviations used, see AR 320-50.